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CIRCULATION.

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A WORD OF APPRECIATION.

Often it has been our painful duty to comment harshly upon the nonsense published by Canadian newspapers concerning mining. It is pleasant, therefore, to have the opportunity of saying a few words in appreciation of the efforts of several daily journals.

Three Canadian dailies, one in Nova Scotia, one in Ontario, and one in British Columbia, issue regularly at the beginning of the New Year, special reviews of annual progress. The Toronto Globe's articles on mining in the supplement to its January 1st issue are decidedly the best that have ever appeared in its columns. In the Halifax Morning Chronicle, for the same date, there were excellent resumes of mining in Nova Scotia. The Nelson Daily News, which is not yet to hand, has for some years favoured the public with exhaustive articles from the pen of Mr. E. Jacobs.

To these papers, and to several others in Ontario and British Columbia (and here it is not invidious to mention the Cobalt Nugget and the Porcupine Press), the investor and the miner owe a great deal. It is not easy for the daily newspaper to sift closely the true from the false in dealing with despatches from mining camps. But it is desirable and practicable to engage only well-informed writers to contribute to its columns. The three newspapers mentioned have chosen the best available authorities.

A few weeks ago the Canadian Mining Journal won the disapproval of its vigorous contemporary, the Toronto Saturday Night, for venturing to suggest that the mining industry needed more publicity. Our critic evidently mistook the point of our suggestion.

There is nothing more beneficial than timely publicity. This has nothing to do with the touting of flotations. The publicity that is desirable is just such as that given to the industry of mining in the annual reviews referred to above. But this can be carried much further. We believe that it is the duty of the mine manager, not alone to see that no exaggerated or false items concerning his mine get into the papers without prompt contradiction, but also to undertake to give the investing public exact and regular information. Naturally, this does not hold for the manager of a mine that is privately financed. In these circumstances the manager can rightly withold all facts. But when the shares of any mining enterprise are being openly traded, the manager who permits falsehoods to be circulated, either to the detriment of the mine or otherwise, is morally culpable.

Hence there is pressing need of some general arrangement whereby succinct reports of the physical condition of all important mines be given out regu-

larly. This is done in South Africa on a very large scale, and all over the world where responsible capitalists control operations. It is the one and only cure for the lamentable conditions that prevail in our stock exchanges. As a matter of fact, Canadian mining exchanges have become such hotbeds of unholy doings that special legislation is being seriously considered by the proper authorities. Legislation, however drastic, will be of no avail. The disease is deep-seated. The remedy lies in the hands of the mine owners and mine managers.

To become more specific, there are dozens of Porcupine promotions of which nothing is known beyond the eloquence of a prospectus. Think for a moment what a readjustment of share values there would be were the managers instructed to publish monthly statements covering the work done and the value of ore developed!

And there is absolutely no good reason why this should not be done. If an enterprise cannot bear the light of day who on earth wishes to put his money in it? To which it can be answered that the industry and the profession of mining are being made subservient to groups of speculators that they may profitably carry on a huge game of poker—with marked cards!

THE GEOLOGICAL SURVEY AND THE MINES BRANCH DURING 1911.

Both Branches of the Department of Mines, Ottawa, did vigorous work during the past twelve months. In this number of the Canadian Mining Journal will be found specially written accounts of the labours of each.

The officers of the Survey covered much ground. The summer's record included a geological reconnaissance across the Rocky Mountains; a palaeontological study of Carboniferous rocks on the shores of Chignecto Bay, Nova Scotia; a close inspection of part of the Alaska-Yukon boundary; an investigation of the Tulameen (B.C.) diamonds; a detailed examination of the area surrounding and including the West Shining Tree district, Ontario; the mapping of the coal area situated where the Grand Trunk Pacific crosses the Rockies; a further examination of the gold bearing series in Lunenburg and Queens counties, Nova Scotia; an investigation of deposits of clay and shale in various parts of Canada; a study of one hundred square miles in the vicinity of Nelson; the completion of a geological study of the Portland Canal district; the examination of typical mica, graphite, and apatite deposits in Quebec, and the investigation of the petroliferous and gas-bearing region south of Moncton, New Brunswick. In addition several parties were assigned special stratigraphical and topographical duties, and the divisions of Natural History and Anthropology continued their regular tasks.

The Survey moved during the year into more commodious quarters in the new Victoria Memorial Museum. The old quarters had long outlived their usefulness. It is now possible to exhibit to some advantage the collection of specimens that has been accumulating for years.

The protracted illness of the Director, Mr. R. W. Brock, interfered somewhat with the work. Nevertheless the season has been successful.

Sporadic attempts have been made to continue the publication of regular press bulletins. This duty should devolve upon a specially appointed officer. It is well to keep the public informed.

The Mines Branch, which, as we have mentioned before, is now settling down to its proper work, undertook several new investigations, besides continuing those commenced before 1911. Material was gathered during the year for monographs on the Sudbury nickel-copper deposits; and on the salt and gypsum industries; on Canadian feldspar and phosphate deposits. Most important of all, the Canadian market for certain mineral commodities was looked into thoroughly. The results of this last-mentioned mission will be of great commercial interest. We predict that this is but the beginning of a campaign that will lead to large industrial developments.

The testing of processes, especially methods of concentrating iron ore and of utilizing peat, was continued vigorously. Plans were made and a site secured in Ottawa for a large testing station where explosives will be tested, and all the phenomena connected with coal-mine explosions investigated. Here, also, the use of the rescue apparatus will be demonstrated. This establishment will be of great importance in bringing before the mine owner modern methods of preventing the loss of life in mines.

* * * *

The Geological Survey and the Mines Branch are institutions that deserve the support and encouragement of every citizen. They are, as they should be, as non-political as frail human nature can make them. Both are assisting in building up the nation. Both strive to educate the people; to help the prospector, the miner, and the investor; and to advertise abroad the resources of Canada. The usefulness of both is limited by totally insufficient appropriations of money. We look to the present Government to correct this needless evil.

EXIT HAWTHORNE.

Justice bids fair to overtake that most picturesque of mining promoters, Julian Hawthorne. The United States Post Office Department has been on his trail for some time. On the afternoon of January 5th Hawthorne; Josiah Quincy, ex-Mayor of Boston; Albert Freeman; John McKinnon; and Dr. William J. Morton were indicted in New York on the charge of misusing the mails in a scheme to defraud investors in certain mining enterprises.

THE TORONTO WORLD

...on Favors Higher Prices

JULIAN HAWTHORNE

Well-Known Author, Has Entered the

Montreal River District on a Large Scale

Hawthorne Syndicate owns the Temagami-Cobalt Mines, Limited, The Elk Lake-Cobalt Mines, Limited, and The Montreal-James Mines, Limited, and is now branching out into the Shining Tree Lake and Welcome Lake districts.

It has, for some time past, been known to The World, and possibly also to the better-informed portion of the Toronto public, that Mr. Julian Hawthorne has been writing to friends of his in the States, inviting them to join him in a mining project in Ontario. Not until to-day, however, has full and trustworthy information on the subject been received.

This is due to the fact that, for reasons best known to themselves, Mr. Hawthorne and his associates have been conducting their operations very quietly; at any rate, they have thus far avoided publicity. So no mention of their proceedings has been made, and it was, indeed, by the merest accident that The World became possessed of the information.

THE TEMAGAMI-COBALT MINES PROPERTY.

The fact is, that the Hawthorne Syndicate has entered Ontario on a scale which might be described as stupendous. It is stated that the Syndicate, some time last September, started operations on ... is known as the Diabase Peninsula ... White Be... within two ... miles ... Temagami rail... T... wr... in... piece of the ... been unco... line, ...

BRAINS, PUSH AND MONEY.

From these data it would seem that the Hawthorne Syndicate is backed, not only by pluck, energy and foresight, but by no end of money as well. For operations on a scale such as theirs require big money, and when it is realized that the money they are spending is their own, and that they are not organizing stock companies, it will be understood that it means, on their part, deep-rooted confidence in the future of the Ontario silver zone. For mining of this sort, The World is free to say that it entertains high respect. We deem it more than probable that American pluck and push are going to win out once more. The members of the Hawthorne Syndicate are people of the kind that makes history; and we should not be surprised if, in this instance, they made money, too.

Supplies have been forwarded for two camps of one hundred men—one camp at Shining Tree Lake, the other at Welcome Lake. As soon as the snow melts, the Hawthorne Syndicate will begin systematic prospecting of their immense holdings. It is certainly remarkable that, until now, nothing has been known of the operations of these men. If nothing else had drawn attention to them, it would be thought that the amount of machinery and supplies going into their properties would have done so. However, The World at last presents the facts.

... has ... the Welcome ... district, ... but an area ... ually large. It is reported that they have recorded more tha... 100 claims (4000 acres) in that district alone.

All of the accused pleaded "not guilty." Bail to the amount of $25,000 was demanded of Freeman, and $10,000 each for his associates.

It is alleged by the Post Office Department that the defendants received nearly three and one-half million dollars from sales of shares in the Temagami-Cobalt Mines, Limited; the Elk Lake-Cobalt Mines, Limited; the Montreal-James Mines, Limited; and the Hawthorne Silver and Iron Mines, Limited. Astonishing as this may seem, it is probably well within the truth.

That Mr. Julian Hawthorne has been, or is now, the head and front of the offenders is not likely. He has, of course, prostituted his literary talents — talents never of a high order — to the basest uses. But he has been a mere puppet, albeit a very willing puppet, in the hands of clever and unscrupulous promoters.

Several times has the Canadian Mining Journal exposed Julian Hawthorne. It is of historic interest to recall one of the first incidents.

In our issue of April 15th, 1909, there was reproduced from the Toronto World a glaring advertisement of the Temagami-Cobalt Mines, Limited. These reproductions are given herewith.

Our readers will perceive that the Toronto World fully endorsed all of Hawthorne's statements. They will notice, moreover, one prophetic sentence: "The "members of the Hawthorne Syndicate are people of "the kind that makes history; and we should not be "surprised if, in this instance, they made money, too." The "we" stands for the Toronto World.

Let us reproduce here, also, part of an editorial paragraph of our own, leaving out several unkind references to the Toronto World:—"Julian Haw- "thorne, unworthy son of worthy Nathaniel, is a "magazine writer. He is also a sublimated ass. More- "over, he has been shown up by one or two responsible "mining journals in the United States. In fact, he is "so patently a pretender that we do not wish to waste "more space upon him."

In the interests of decency we hope that the United States authorities will spare no pains to investigate fully all the Hawthorne flotations. This should have been done in Canada long ago. Our mails are sewers of corruption.

THE GEOLOGICAL SOCIETY OF AMERICA.

The Annual Meeting of the Geological Society of America, which includes in its membership practically all the geologists of Canada as well as of the United States, was held at Washington on the 27th, 28th, and 29th of December.

Canada was well represented. Amongst the delegates from this side of the line were Dr. F. D. Adams, Dr. A. E. Barlow, Messrs. Brock and Cairnes of the Geological Survey of Canada; Dr. W. G. Miller and Mr. Knight, of the Ontario Bureau of Mines; Professors Coleman, Walker, and Parks, of Toronto University; Professors Baker and Nicol, of the Kingston School of Mining; and Messrs. Tyrrell and Ferrier, of Toronto.

Of the papers read, several were of special interest to Canadians. These were: "Pre-Cambrian Formations in South-Central British Columbia," by Professor R. A. Daly; "Occurrence of Petroleum Associated with Faults and Dikes," by Frederick G. Clapp; "Progress of Opinion as to the Origin of the Iron Ores of the Lake Superior Region," by N. H. Winchell; "Glacial Investigations in Minnesota in 1911," by Frank Leverett; "Recent Studies of the Moraines of Ontario and Western New York," by Frank B. Taylor; "Differential Erosion and Isoplanation in Portions of Yukon and Alaska," by D. D. Cairnes; "Oscillations of the Land Round Hudson Bay," by J. B. Tyrrell; and two papers by C. D. Walcott, "Middle Cambrian Crustaceans from British Columbia," and "Fossils from the Huronian Rocks near Steep Rock Lake, Ontario."

On the evening of December 28th, the annual dinner was held at the Ebbitt House. About 225 were present. Dr. Clarke, of Albany, was Toastmaster. To illustrate his introductory speech he displayed a number of sensational lantern slides. One of these represented the Directors of the Geological Surveys of Canada and the United States resting amicably together on a seashore, while Mr. Taft and the Rt. Hon. Mr. Borden were standing in the distance in attitudes anything but peaceful. This effort was entitled "Reciprocity." Another picture portrayed Dr. Adams as a redoubtable mountain climber. A third showed a New York professor of geology as Mona Lisa! Thus is the spirit of good-fellowship preserved. Dr. Adams and Mr. Brock were among the principal after-dinner speakers.

On the evening of the 29th, the retiring president, Professor W. M. Davis, of Harvard, delivered an address on the "Relations of Geography to Geology." The address was followed by a smoker, presided over by Dr. E. W. Parker, of the U. S. Geological Survey.

Each session, and the meeting as a whole, were profitable and enjoyable. It may be suggested, however, that the prevailing tone of all the papers read is too highly academic. An occasional co-ordination of the economic and the abstrusely scientific would prove beneficial. It is true that the Canadian Mining Institute and the American Institute of Mining Engineers absorb most of the technical and practical papers. Yet there should be no difficulty in obtaining from many of the members of the Geological Society papers that at least overlap mining. If this be not done there will be grave cause to fear intellectual Pharisaism and dry-rot. The academic mind is prone to isolate itself, and to take itself far too seriously. The modern geologist, to live up to his high calling, must know where and how his studies and researches fit into the scheme of real life.

Hence we suggest, respectfully, that at the Society's next Annual Meeting there be presented a saving number of economic topics. Not only will this be salutary,

but it will also tend to rouse public interest. It must not be forgotten that the public, even the mining public for whom geology was made, always shies at ponderous and paralyzing polysyllables. Is it not practicable for the geologist to smite his fellow with a 12-inch concatenation of sounds, without neglecting the lay mind?

We remember well Dr. Kemp's address before the Canadian Mining Institute, an address remarkable for its simplicity and its practical meaning, in which he showed how the geologist had saved the Corporation of the City of New York hundreds of thousands of dollars by controlling the tunnelling, the excavating, and the general course for the city's new water supply. Material of this kind is needed by all of us. Let us have more of it.

THE WORLD'S PRODUCTION OF IRON AND STEEL.

While the world's total output of iron ore in the year 1909 was about 130,000,000 tons, an amount 2½ per cent. below that of the year 1907, all available returns indicate that the output in 1910 was considerably higher than that of 1907.

The world's production of pig iron during 1910 amounted to about 65,000,000 tons, the United States contributing 27,300,000 tons; Germany, 14,556,000; Great Britain, 10,000,000 tons; and France, 3,970,000 tons.

By far the greater part of all the pig-iron produced is manufactured into steel. From the records of the last five years it is learned that Great Britain converts 56 per cent. of her pig-iron into steel; the United States, 74 per cent.; Germany, 76 per cent; France, 64 per cent.; and industrious Belgium, about 83 per cent.

A rough estimate of the world's steel production places it at 59,000,000 tons. Of this quantity, Great Britain, Germany, and the United States account for about 46,000,000 tons, or 78 per cent.

Of all iron ore producing countries, Sweden has considerably the largest per capita annual output, returns showing that nearly one ton of ore is mined per head of the population. Comparing this with other countries, we find that in the United States the corresponding figure is about three-fifths of a ton per head; in Germany, above two-fifths; and in Great Britain about one-third of a ton.

It is worthy of note that Great Britain has not only dropped behind in the race, but that her annual tonnage of iron ore has fallen from a maximum of over 18,000,000 tons in the year 1882, to about 15,000,000 tons for 1910. Germany has outstripped her; but the United States output continues to exceed that of both Great Britain and Germany combined.

Another feature of importance is the fact that Great Britain exports more pig iron than all other countries combined. Her average yearly exports during the last five years were 1,443,000 tons, or 15 per cent. of the total British production. Unquestionably this heavy export trade has been built up partly because of the conservatism of the British in adopting modern methods of steel-making; and partly because of the high quality of Scotch and English foundry pig-irons. It seems to imply, however, an avoidable industrial loss.

* * * *

In reviewing figures and facts like those above, the curious mind will begin speculating upon Canada's future. How long will our iron industries require artificial stimulants? Is not a tariff wall a wiser and safer expedient? Why are not our railroad magnates and our iron-masters conspiring to exploit domestic ore deposits? Why is the whole industry at the mercy of politicians? Other questions rise. When will they all be answered?

Our iron and steel industries are the product of private enterprise, sometimes aided and often crippled by governmental interference. Official help, to be effective, should be definite, carefully applied, and not dependent upon the vagaries of Ottawa. Canada has all the essentials that go to make up the basic industries of iron and steel making. So far the mountain has brought forth only a sickly mouse.

EDITORIAL NOTES.

Two years ago the Western Branch of the Canadian Mining Institute requested the Dominion Government to admit free of duty all mine-rescue apparatus. This request was not complied with. At present these devices are dutiable. They are classed as mining machinery. To obtain a refund of the duty, a long process of red tape is necessary. Why rescue apparatus cannot be classified properly and put on the free list is not apparent, which is more than can be said of the stupidity of the authorities at Ottawa.

The White Pass and Yukon Railway Company is one of the large factors in the development of northern British Columbia, southern Alaska, and Yukon territory. At the annual meeting of the company, held last month in London, Mr. O. L. Dickeson, the general manager, alluded to the intention of the company to supply Yukon dredging companies with fuel oil to take the place of the diminishing and costly wood supply. Mr. Dickeson also referred to certain promising quartz veins that are being opened up in the Taku Arm district, between Caribou and Atlin, and informed the meeting that the White Pass and Yukon Company had assisted the citizens of Skaguay in the promotion of a sampling mill. Low freight rates are charged for handling sample shipments, and the charges at the mill are brought down to actual cost. In these and in other ways the Company is doing much to encourage the prospector and the miner.

The new Civil Service Commission should not neglect to consider at an early date the practicability of increasing the salaries of technical officers on the staff of the Ottawa Department of Mines. To advertise for experienced engineers, offering a salary of $1,800, is a cruel farce.

In formal business phraseology the cable announcement came on New Year's Day that the firm of Wernher, Beit & Co., had been dissolved by mutual consent. Wernher, Beit & Co. made history in South Africa. The firm made many millions there and put millions back. Mr. Otto Beit, the brother and heir of the famous Alfred Beit, is enormously wealthy. His former partner, Sir Julius Wernher, is also amply blessed with this world's goods.

CORRESPONDENCE

CONCERNING CONSERVATION.

Exhibit I.

"The Quip Quarrelsome."

Sir,—In your issue of December 1st I note an editorial entitled "An Indictment of Conservation." Inspired by the animus that you have consistently shown, you quote with tacit approval the ridiculous statements made by Mr. Stevens—statements that anyone with even a superficial knowledge of mines and mining, knows to be absolutely false. For example, Mr. Stevens states—and receives the stamp of editorial approval—that "in a single county of Michigan there "is more iron ore than any 'professional conservation-"ist' has estimated to exist in the whole world." I have no conservation data for the whole world, but, in the report of the United States National Conservation Commission, I find the supplies of iron ore in the United States estimated at 4,785 million tons—say four and three-quarter billion tons! The International Geological Congress, 1910, estimated the available iron ore resources of the world at 22,408 million tons, say, and of the whole state—not a county—of Michigan at 285 million tons. Does Mr. Stevens? Does anybody with any regard for a reputation for accuracy and veracity, mean to say that a single county in Michigan contains four and three-quarter billion tons of iron ore, much less, twenty-two and a half billion?

So far as his statements concerning the Guggenheim investments are concerned, if they have in the Bonanza mine a "sort of copper-plated gold brick," it is due to their having been misled by their own engineers. It is a somewhat novel proposition that, because, according to the erratic Mr. Stevens, they have made a losing investment in copper, they should be allowed to recoup themselves by taking up large areas of coal lands in defiance of the law! He further says that they are compelled to import "inferior" coal from British Columbia. The best information that I have is that Vancouver Island coal is of as good a quality as the Alaska coal and that much of the so-called, high grade Alaska coal should be "mined with a spoon." The editor of the CANADIAN MINING JOURNAL would be better employed if he endeavoured to get some reliable data to controvert aspersions upon one of our most important mineral resources instead of giving them a quasi confirmation. If Stevens et al would devote their attention to getting proper mining laws for Alaska instead of wild and untruthful denunciations of all and sundry, they would, at one and the same time, achieve something material and raise themselves in the estimation of all right thinking persons.

As for the statement that Alaskans are compelled to "pay double or triple" the price for fuel that they would pay if the Alaskan coal beds were developed, it is absolutely the reverse of correct, either in substance or in detail.

Respecting his assertion that the Washoe smelter may be shut down to save some trees in the federal forest reserves that are only fit for tepee poles, I have the word of the Chief Forester of the United States that the fumes have destroyed "forty million feet of merchantable timber," and that all that is needed is the installation of special appliances to eliminate poisonous fumes from the smoke.

When a man calls conservationists "political economists of the Stone Age and first cousins in mental capacity, to the Troglodytes"; when he raves that "the most odious forms of despotism" are being imposed upon miners in the Western States; that the conservation movement is a "cleverly devised scheme" to fix upon the necks of Americans "the "iron collars of serfdom"; that Americans are suffering from "an extensive system of paid spies, an organized claque," etc., ad nauseam, it is charitable to assume that he is intoxicated with his own verbosity, particularly when his statements are so grossly inaccurate. It would be flattery to say of him, that he has constructed a number of very large edifices upon a knife edge breadth of fact.

But what shall be said of the editor who gives these astounding statements a quasi endorsation. The statement, by inference, that "many blunders and not a few political sins are being committed in the name of conservation," either says too little or too much. Does the editor of the CANADIAN MINING JOURNAL mean to say that "blunders" and "sins" are being committed in Canada in the "name of conservation?" If so, what are they? If not, why not specify the United States as the country to which he refers? Or, is this cunningly worded ambiguous sentence part of the campaign against the Conservation Commission initiated nearly two years ago at the instigation of a geologist in Ottawa whose political activities are not unknown and his alter ego in Toronto, both of whom are at present nameless but may not continue nameless very much longer.

In your issue of May 15th, 1909, you stated that "lumbermen, farmers and miners" were not represented on the Conservation Commission. You continued, "Are lumbermen, farmers and miners not to be trusted? Are they uniformly robbers and plunderers? Or are they ignorant children who forsooth, must be led by the hand?"

When this precious balderdash was penned, there were on the Commission, the following representatives of the lumbering, the agricultural and the mining interests: from each province, the Minister of that province charged with the administration of its forests, lands and mines, the Minister of Agriculture, the Minister of Mines and the Minister of the Interior for the Dominion; also five lumbermen, the late head of the famous Macdonald Agricultural College, a Deputy Minister of Agriculture, and the Dean of the only Forestry School in Canada, twenty in all! And the CANADIAN MINING

JOURNAL tells us that the lumberman, the farmer and the miner are not represented! It must have been a surprise to the Hon. Frank Cochrane, for instance, to be informed by your sapient self that although Minister of Lands, Forests and Mines for the premier province of the Dominion, he does not "represent" those interests. It is to be hoped that the advice you, at intervals, tender to the mining interests of Canada is based upon more accurate information than you seem to have had in this instance, assuming, as a matter of course, that you would not stoop to making wilfully false statements. Possibly your advice is so freely tendered upon the principle that the best man to settle a difference of opinion is the man who does not know anything about it because he is not biassed either way?

JAMES WHITE,
Secretary, The Commission of Conservation.
Ottawa, Dec 15, 1911.

Exhibit II.
"The Retott Courteous."

EDITOR CANADIAN MINING JOURNAL:—
Toronto.

Sir,—I have before me your issues of December 1st and December 15th, and note your editorial, "An Indictment of Conservation" in your issue of December 15th.

In your editorial on my address before the American Mining Congress, you quote. as a specimen of my "denunciatory eloquence": "The entire American industry is threatened by men operating under the names of progress and reform, but who are political economists of the Stone Age, and first cousins, in mental capacity to the Troglodytes." You comment on this that I adopt brass knuckles, and that my language is extravagant and intemperate, and also state that my language is far from dispassionate, and state that while my attitude does not remotely resemble the judicial, yet I voice a growing belief that many blunders and not a few political sins are being committed in the name of conservation. From your own editorial on organized labour, fifteen days later, I extract the following excerpts: "This is but one instance of the desire of demagogues from the United States to control Canadian labour, to add to their own exchequer the revenues derivable from Canadian miners and other workmen. Canada has not been cursed with the hired assassin and the professional dynamitard. Why her workmen should contribute to the support of these classes in the United States is not clear."

Regarding this latest quotation from your columns, I beg to observe that, "extravagant and intemperate as your invective may be, there is certainly a degree of right on your side. While your language is far from being dispassionate, and while it does not even remotely resemble the judicial, yet you voice a growing belief that many political sins are being committed in the name of—labour."

HORACE J. STEVENS.
Houghton, Mich., Dec. 27, 1911.

BOOK REVIEW

Types of Ore Deposits—Edited by H. Foster Bain—with Chapters by H. Foster Bain, E. R. Buckley, S. F. Emmons, W. H. Emmons, F. H. Hatch, J. F. Kemp, A. C. Lane, C. K. Leitch, T. A. Rickard, and others—378 pages. Illustrated—Price $2 postpaid. Published by the Mining and Scientific Press, 420 Market St., San Francisco, and the Mining Magazine, 819 Salisbury House, London, E.C., 1911.

This is the latest of the timely series of compilations published by the Mining and Scientific Press under the able editorship of Mr. T. A. Rickard and Mr. H. Foster Bain.

The material is not new. Some of the chapters were first published as articles in the Mining and Scientific Press; two were originally papers read before the Canadian Mining Institute; and the rest are taken, mainly, from the Transactions of the American Institute of Mining Engineers, and the reports of the United States and the State Geological Surveys. The general discussion of the origins of oreshoots was first printed in Economic Geology. This discussion forms the concluding chapter.

A summary of Mr. Bain's introduction shows the purpose and scope of the book. "The science of ore "deposits" says Mr. Bain, "has become so broad that "no one man can hope to compass the field." With this indisputable fact in mind, the compiler has selected a series of descriptions of typical ore deposits, each description written by an engineer or geologist who is especially familiar with the given type. The plan of treatment followed is first, a plain statement of facts, then the author's interpretation of those facts.

The book is not complete; but, as far as it goes, it is representative. It presents the actual diversity of types of ore deposits, and, as well, the different interpretations of observed facts.

As illustrating this last clause there may be cited the early belief, a belief still not without supporters, that many bedded ore deposits were formed like sedimentary rocks. In reality, despite external appearances, many of these bodies have replaced pre-existing sedimentary beds. Mr. J. D. Irving deals fully with this phase in a chapter entitled "Replacement Orebodies and the Criteria by means of which they may be recognized." Other bedded deposits of undoubted sedimentary origin, are described by Mr. C. H. Smyth, Jr., who takes the Clinton type of iron-ore deposits as his text.

The principles laid down by Van Hise are applied, with only incidental qualifications, by Prof. C. K. Leith in the chapter on the Lake Superior type of iron-ore deposits. Prof. Leith differs from Van Hise in emphasizing the relation of the ores to certain ellipsoidal basalts and suggests that derivation of the ores from them may have been not only through processes of weathering, but through direct contribution by juvenile waters. This is in keeping with the trend of opinion during the last decade.

Mr. Bain himself is responsible for the third chapter which treats of the flats and pitches of the Wisconsin lead and zinc district. One object of the chapter is to demonstrate the primary origin of these deposits—the absence of any direct relations to igneous rocks or agencies. The fact is alluded to that there is general agreement as to the main conclusion—that the lead and zinc ores of the upper Mississippi Valley were deposited by meteoric waters circulating at shallow depths.

The lead and zinc deposits of the Ozark region, (Missouri—Arkansas) are described by Mr. E. R. Buckley. As to the origin of these commercially important and structurally varied deposits Mr. Buckley disagrees

with Van Hise and Bain, who held that artesian waters were the first concentrating agents. He maintains also that the ores were formed by meteoric waters circulating through only the water crust of the earth, and deriving their metallic contents by leaching both igneous and sedimentary rocks, but having no other relation to the latter.

Dr. A. C. Lane, in his chapter on Lake Superior native copper deposits, accentuates the genetic relationship of these deposits with certain igneous rocks.

In the chapter on the Cobalt district, originally read by the late S. F. Emmons before the Canadian Mining Institute, the Cobalt deposits are described as the roots of old veins greatly enriched by repeated secondary action. (Editor's Note:—With all due respect to Mr. Emmons' opinion, it may be stated that those who know Cobalt best do not support him). In other chapters Mr. O. H. Hershey takes up the Treadwell deposits, characterizing them as essentially primary; Mr. T. A. Rickard describes the saddle reefs of Bendigo, a special type of deep-seated veins; Dr. Kemp outlines the geology of contact deposits and the influence of magmatic waters; Mr. F. H. Hatch writes on the conglomerates of the Witwatersrand; Mr. J. D. Irving on replace orebodies; Mr. W. H. Emmons on outcrops of orebodies; and Mr. R. A. F. Penrose on certain causes of oreshoots.

Mr. Bain sums up, thus the light that is shed on the future study of ore deposits by this resume:—First, no single theory can explain all types of ore deposits; Second, discussions as to relative importance of different processes are not profitable. Personal opinions must obtain until quantitative methods of geological work make notable advance. Third, there is need of more refined methods of investigation. Hypotheses must be tested by experiment. Fourth, a large body of accurately determined facts is required, particularly in recording the development of mines. Fifth, there should be much less generalization from the study of single types or districts, and more careful comparative studies.

We can, without hesitation, recommend this volume to our readers. It is not a text-book, nor is it intended for such. But it is remarkably inspiring and informing. It represents the cream of late economic geological thought in the United States.

THE WORK OF THE GEOLOGICAL SURVEY DURING THE YEAR, 1911

(Specially written for the Canadian Mining Journal.)

In addition to the regular office routine, the field work of the Geological Survey for the year 1911 was vigorously prosecuted, and investigations were carried on in various parts of the country by all the divisions of the Department. The removal of the Department early in the year to its new quarters, in the Victoria Memorial Museum, and the consequent opportunity afforded for expansion in museum work also necessitated a great deal of cataloguing and re-arranging of the excellent collection of material which has been assembled by the Survey and which it was impossible to exhibit properly in the narrow quarters of the old Museum. A few notes on the work of the various members of the technical staff may be of public interest:—

Geological Division

Mr. J. A. Allan continued the study of a section across the Rocky Mountains, along the line of the Canadian Pacific Railway. He also made a reconnaissance in the Beaverfoot Range and studied the mineral deposits.

Mr. W. A. Bell made a palaeontological study of the Carboniferous rocks exposed along the shores of Chignecto Bay, with the object of determining the physical conditions of deposition of the Carboniferous sediments of the Cumberland and adjacent coal basins.

Dr. D. D. Cairnes studied the geology of an area sixty miles long and five miles wide, along the Yukon-Alaska Boundary, between the Yukon and Porcupine Rivers. He also made a preliminary examination of the quartz veins in the Klondike district.

Mr. Chas. Camsell examined the gravels of the Tulameen River, for the purpose ofo btaining further information regarding the occurrence of diamonds in that district. He also made a study of the geology of Steamboat Mountain, Siwash Creek and Fraser Canyon, besides making a reconnaissance into the country west of Lillooet.

Mr. Chas. Clapp carried on a detailed survey of the Nanaimo district, in which is situated the producing mines of the Nanaimo coal field. A visit was also made to the Cumberland-Comox and Suquash coal fields.

Mr. W. H. Collins continued a detailed examination of a rectangular area seventy-two miles by forty-eight miles, lying about fifty miles north of Sudbury. This includes the West Shining Tree District which has already been brought to the attention of the public by the discovery of gold in Keewatin schists.

Dr. R. A. Daly made a reconnaissance of the area covered by the Shuswap sheet, with a view to issuing a report on the same. The map of this part of British Columbia has already been published by the Geological Survey.

Mr. D. B. Dowling finished mapping the coal area immediately adjoining the Grand Trunk Pacific in the Rockies, and visited a number of localities in Alberta and Saskatchewan where new mines are being opened.

Mr. E. R. Faribault was engaged in an examination of the gold-bearing series in the southern part of Lunenberg and Queens counties. He also made a detailed examination and survey of the following gold districts: Blockhouse, Mill Village, Vogler's Cove, and Middlefield or Fifteen Mile Brook. Scheelite was discovered in a vein at Middlefield and visits were paid to the tungsten discoveries at Waverley and Baker's Settlement, to the tin and tungsten discovery near Mill Road in the vicinity of New Ross, and to the scheelite mines which are being operated near Moose River.

Prof. A. G. Foerste spent some time on Manitoulin Island studying the subdivisions of the Lorraine and Richmond formations.

Dr. J. W. Goldthwait spent some time during the summer in examining and tracing the raised beaches in the peninsula of Gaspe and in New Brunswick.

Mr. R. Harvie continued an examination of the serpentine belt of southern Quebec. In the district exam-

ined the serpentine is of less importance than farther north, but important copper ores are found associated with the diabase. The discovery of a new locality for fossils on Lake Memphremagog is of importance in permitting of a more accurate determination of the age of the formations of that section.

Mr. E. D. Ingall was engaged in a study of the geology of Ottawa and vicinity. Much of his time was also spent in the examination of borings and in keeping in touch with drilling operations throughout the country, for the purpose of getting information bearing on geological problems and of rendering assistance to the drillers in their operations.

Mr. W. A. Johnston completed the three topographical sheets covering the country in the vicinity of Lake Simcoe. These sheets are to be published on the scale of one mile to one inch. The work involved also a study of the superficial deposits and of the Ordovician formation.

Mr. R. A. A. Johnston worked on a mineral index, with a view to publishing an annotated list of the minerals of Canada. The examination of mineral samples sent in for identification also consumed much of his time.

Mr. Jos. Keele examined a great number of scattered deposits of clay and shale in various parts of Canada and made laboratory tests of samples taken and of samples sent in to the Survey to be reported upon.

Mr. L. M. Lambe was engaged in studying the many recent and valuable accessions to the museum and in preparing for the arrangement and proper public display of the collections of fossil vertebrates.

Dr. A. C. Lawson visited the section of the country along the Canadian Northern Railway from Fort Frances east to Steeprock Lake, and reviewed the geology in the light of knowledge obtained regarding Pre Cambrian geology during the last twenty-five years. This section of country had formerly been worked over by Dr. Lawson in 1885-1887.

Mr. W. W. Leach made a study of the geology of the Blairmore-Frank coal field and measured a number of sections, preparatory to the publication of a map of that field.

Mr. O. E. LeRoy examined the geology of one hundred square miles in the vicinity of Nelson, and under his direction Mr. J. Drysdale mapped an area of sixteen square miles embracing the Franklin camp.

Mr. G. S. Malloch made a traverse from Hazelton to Groundhog Coal Basin, and made a preliminary examination of the south end of this basin. He also examined the geology of the Kispiox Basin and visited a number of the more recently discovered metalliferous deposits near Hazelton.

Mr. R. G. McConnell completed his work in the Portland Canal district and made a study of the geology and mineral deposits on Observatory Inlet and Salmon River.

Mr. Wm. McInnes was engaged in work on the map of a portion of Saskatchewan and in work in connection with a study of the Coal Resources of the World for the International Geological Congress.

Mr. J. J. O'Neill made a petrographic study of Mt. Beloeil and Rougemont, to complete the study of the Monteregian Petrographic Province.

Dr. P. E. Raymond directed his attention to the subdivisions of the Ordovician formations in southern and eastern Ontario. The latter part of the season was spent on the rocks in the vicinity of Quebec and Point Levis and on rocks of the same age between Point Levis and Lake Champlain.

Mr. L. Reinecke did the geological work for the Beaverdell sheet and examined the more important prospects embraced within the sheet and in the country adjacent.

Dr. Heinrich Ries continued his examination of clay and shale deposits in the western provinces of Canada, and also visited Eastern Ontario and Quebec.

Mr. S. J. Schofield studied the geology and ore deposits to the south-west of Cranbrook and examined a group of deposits around Kimberley.

Mr. J. Stansfield examined typical mica, graphite and apatite deposits in the Townships of Buckingham and Hull and the Seigniory of La Petite Nation.

Dr. Clinton R. Stauffer continued his study of the Devonian system in the south western part of Ontario.

Dr. Marie C. Stopes made a palaeontological study of the Little River Series in the vicinity of St. John, New Brunswick.

Mr. F. B. Taylor continued a study of the Moraines and drift deposits of southwestern Ontario.

Dr. C. D. Walcott was engaged in the study of the Cambrian fauna of the Rocky Mountains in the vicinity of Field.

Mr. W. J. Wilson studied our collection of fossil plants, selecting specimens for exhibition in the museum, labelling and cataloguing.

Mr. M. E. Wilson made a geological examination of the country along the Height of Land, south east of Lake Abittibi, where some prospecting has been done and quartz veins are found in the Pre Cambrian rocks.

Dr. G. A. Young made a study of the geology of the area south of Moncton, with special reference to the occurrence of petroleum and natural gas in the Stony Creek field and the oil shales of that portion of the province. Under his direction Mr. H. E. Kramm investigated the mode of occurrence of the gypsum deposits at Hillsborough.

Topographical Division

There were several parties engaged in topographical work. Mr. W. H. Boyd, Chief Topographer, had a party working in the vicinity of Coleman, Blairmore, Frank, Bellevue and Hillcrest, preparatory to the publication of a topographical sheet on the scale of one mile to one inch. He also completed a detailed map of Turtle Mountain and the Frank Landslide.

Messrs. R. H. Chapman and K. G. Chipman mapped a portion of Vancouver Island, embracing Nanaimo, Alberni and Cowichan Lake; the former doing the work for the northern part of the sheet and the latter for the southern part.

Mr. W. E. Lawson made a topographical survey for a sheet on the scale of one mile to one inch, in the vicinity of Moncton, N.B., including the oil and gas district.

Mr. S. C. McLean did the triangulation for a topographical map of the Windermere district.

Mr. A. C. T. Sheppard completed the work on the topography of the Slocan district.

Natural History Division

Prof. John Macoun completed writing a flora of the Maritime Provinces and made collections in the vicinity of Ottawa, preparatory to writing an account of the flora of that district.

Mr. Jas. Macoun was engaged in naming and classifying botanical collections.

Mr. P. A. Travener was engaged in re-labelling the collections and arranging them preliminary to cataloguing.

Mr. C. H. Young spent the summer on the coast of

New Brunswick, collecting material for an East Coast Bird Group. This material has since been mounted.

Anthropological Division

Both museum and field work have been actively conducted by the staff of the recently established Anthropological Division. Dr. E. Sapir, the head of the Ethnology Section, spent some time in a reconnaissance of various Iroquois and Algonquin reserves in Ontario and Quebec.

Mr. C. M. Barbeau made research trips to Lorette, Province of Quebec, to Amherstburg, Ontario, and to Quapaw Agency, Oklahoma, for the purpose of studying the Huron-Wyandots.

Dr. A. A. Goldenweiser of Columbia University, New York, spent part of the summer in studying the social organization of the Iroquois of Grant River Reserve.

Dr. Cyrus McMillan of McGill University spent five months in research in order to obtain folk-lore material among the Micmacs of Nova Scotia and Prince Edward Island.

Mr. Wm. H. Mechling carried on ethnological and linguistic research among the Micmac and Malecite Indians of New Brunswick.

Mr. V. Stefansson continued his researches among the Eskimos of the Arctic region between Mackenzie River and Hudson Bay.

Dr. Harlan I. Smith of the Archaeology section spent some time classifying museum material, and visited village sites in the vicinity of Victoria Road, Ontario, and Washington, Ontario.

Mr. Wintemburg was employed to make an archaeological survey of Blandford Township, Oxford County, Ont.

WORK OF THE MINES BRANCH OF THE DEPARTMENT OF MINES, OTTAWA, 1911

(Written specially for the Canadian Mining Journal.)

An official summary of the work of the Mines Branch will, of course, be published in the annual Summary Report of the Director. In the meantime the following brief resume of the work done during the past year may be of immediate interest.

A large part of the work undertaken by members of the staff during the year is, as might be expected, a continuation of investigations begun during the previous, or in former years. Of the new work initiated during the year, may be specially mentioned the preparation of a monograph on the Sudbury nickel-copper deposits of Ontario; the investigation of salt and gypsum industries of Central and Western Canada; an investigation of feldspar and phosphate deposits; and a special inquiry into the Canadian market for certain metallic and non-metallic minerals and mineral products; of which, considerable quantities are believed to be imported by manufacturers, but which might easily be supplied from Canadian sources.

The laboratory installed during 1910 for the experimental concentration of low grade magnetic iron ores was operated under the direction of Mr. George Mackenzie, assisted by Mr. F. Ransom.

An extended examination was made of the titaniferous iron-bearing sands found at the mouth of the Natashquan River on the north shore of the Gulf of St. Lawrence; and concentration tests were made upon large samples from these deposits. Tests were also made upon ores from Wilbur, Robertsville, Culham, and the Goulais River in Ontario, from Bathurst, N.B., and from Torbrook, N.S.

The systematic investigation of the iron ore deposits of Canada carried on during the last six years by the Mines Branch was continued during 1911 by E. Lindeman, assisted by W. M. Morrison, O. Gallaher, and N. D. Bothwell. Examination was made of the iron bearing deposits along the Central Ontario Railway, and at Calabogie on the Kingston and Pembroke Railway.

The investigation consisted in the study of the geological features of the various iron ore deposits; in taking representative samples of the ores; and in making topographical and magnetometric surveys of the various iron ore fields. The results of the investigation will be published in bulletin form at an early date.

The nickel-copper deposits and the smelting industry at Copper Cliff and Victoria Mines have been the subject of special study during the year by Professor A. P. Coleman of Toronto University, who will prepare a monograph on this industry, giving the latest information with respect to the Sudbury district, with a description of the mines, and of the mining and metallurgical processes in use.

During the early part of the year Dr. A. W. G. Wilson was engaged in collecting material for a report on pyrites and its uses. It is expected that this report will be ready for publication early this year. The investigation into the known copper resources of Canada, begun two years ago, was also continued this season. During the summer all the operating copper mines and smelters in British Columbia were visited, and a report embodying the results of these investigations will be prepared during the present winter.

Under the direction of Mr. B. F. Haanel a series of tests were made with the peat manufactured at the Victoria Road peat bog and at the Government peat plant at Alfred, to show the suitability of this fuel for the production of power when burned in a peat producer gas power plant.

Towards the end of 1910 Mr. Edgar Stansfield, M.Sc., formerly engaged as engineering chemist on the fuel investigations conducted at McGill University—was permanently appointed as engineering chemist to the Division of Fuels and Fuel Testing. In August, 1911, Mr. John Blizard, B.Sc., who was for five years lecturer in Mechanical Engineering at McGill University, and who, during that time was actively engaged in the work of investigating and testing the coals of Canada then being carried on in the laboratories of that institution, was permanently appointed technical engineer to the Division.

Since the addition of the above mentioned officers to the Mines Branch staff, a series of tests with the peat producer gas power plant, as altered by the manufacturers, the Korting Brothers of Hanover, Germany, have been carried on, and a full report is now in course of preparation.

In addition to the peat gas producer, a 125 H.P., Westinghouse, double zone, bituminous coal, gas producer has been installed; which is capable of generating

a gas free from tar—without the employment of mechanical tar extractor, etc. With this producer it is proposed to carry on a series of tests on a commercial scale, of Canadian and imported bituminous coals; to show the economies which can be effected by the burning of coal in such a power plant as compared with our ordinary steam power plant.

Mr. A. Anrep, Jr., who, last year, devoted a part of the time to the manufacturing of peat at Alfred, and towards the end of the season surveyed and examined the Holland peat bog, Ont., devoted the entire summer of 1911 to the examination and delimitation of the peat bogs of Manitoba; with a view to ascertaining their value for the manufacture of peat fuel, moss litter, and other purposes. This report is now being prepared for the press.

The Government peat plant at Alfred was operated again this summer, for a period of 93 days, during which time about 2,000 tons of peat fuel were manufactured.

About 700 tons of this air-dried peat fuel were sold to private parties in Ottawa, Montreal, and elsewhere, for domestic and other purposes; while over 100 tons were shipped to the Fuel Testing Station at Ottawa, where it will be utilized in the peat producer gas power plant for the generation of power to drive the machinery of the ore concentrating laboratory and for other experimental purposes.

Mr. L. Heber Cole was engaged in an investigation of the gypsum and salt industries of Central and Western Canada. During the early part of the summer, the gypsum deposits situated along the Grand River between Cayuga and Paris in the province of Ontario, and the salt area in the district from Windsor to Kincardine in the counties of Essex, Lambton, Huron, and Bruce, were visited.

The gypsum area in Manitoba north of lake St. Martin was then examined and subsequently several gypsum deposits in British Columbia.

The Manitoba deposits have been operated for some years; calcining mills being located in Winnipeg. The British Columbia deposits have not yet been commercially operated; but a beginning is now being made in their exploitation.

Several plaster plants in the State of Michigan were visited, with a view to gaining information respecting their methods of operation.

Mr. Hugh de Schmid was engaged during a part of the summer, in obtaining further information on the occurrence and use of mica; for incorporation in the new monograph upon this mineral, now in the press. The remainder of the season was devoted to an examination of certain of the phosphate and feldspar mines in the Provinces of Ontario and Quebec. It is intended to complete the field work in connection with the deposits of these minerals during the ensuing summer, and monographs upon both these minerals will be subsequently prepared.

Mr. Frechette was engaged in collecting data from manufacturers in Ontario and Quebec concerning the minerals and mineral products used by them, with special regard to the quantity, quality, and source of their present supply. The ultimate object of the investigation is to encourage the use of Canadian minerals, by pointing out to the producers the requirements of the market, and the form in which the minerals should be prepared for the various industries in which they are employed.

During the "field work" Mr. H. Bradley acted as assistant.

Sixty-three towns were visited in Ontario, and twenty-six in Quebec.

A report on the Building and Ornamental Stones of Ontario has been prepared by Dr. W. A Parks of Toronto University, as the result of his special work during the summer of 1910. This investigation is being continued, to cover the whole of Canada. During 1911, not only did Dr. Parks visit Ontario, but also the principal quarries in Quebec and the Maritime Provinces.

In addition to field investigations, laboratory tests on the physical characteristics of the various stones are being carried out under the direction of Dr. Parks at Toronto University.

The subject of explosives—the handling, storage and use of which were investigated during 1910, and reported upon by Captain A. H. P. Desborough—was followed up in 1911 by the preparation (in collaboration with the Department of Justice) of a Bill entitled "An Act to regulate the manufacture, testing, storage and importation of Explosives." The Bill was introduced by the Minister of Mines during the last session, but did not reach the final stages in Committee, before the dissolution of Parliament.

Mr. J. G. S. Hudson investigated and reported upon three disasters in explosive factories, which occurred, respectively, at Sand Point, Ontario, April 27, 1911: Beloeil, Quebec, Sept. 23, 1911; and Rigaud, Quebec, Oct. 19, 1911. A fourth explosion took place in the factory at Departure Bay, British Columbia, on the 22nd of December. Mr. Hudson states that 15 lives were lost in these several explosions.

The National Mine Safety demonstration held at Pittsburg, Pa., U.S.A., Oct. 30 and 31—under the auspices of the United States Bureau of Mines—was attended by Mr. Hudson, as representing the Mines Branch.

The annual collection of statistics of mineral and metallurgical production in Canada was undertaken, as usual, under the direction of Mr. John McLeish, and a preliminary report on the mineral production of Canada during 1910 was issued on March 1, 1911. The complete and revised report was then prepared; special bulletins on the production of Iron and Steel; Coal and Coke; and on Cement, Lime, Clays, Stone, and other structural materials, together with a General Summary of the Mineral Production of Canada, being issued as advance chapters of the full report.

Mr. C. T. Cartwright spent the latter part of the year visiting metalliferous mines in British Columbia; collecting information and data for a revised edition of the general report on the Mining and Metallurgical Industries of Canada. The Statistical Division is now engaged collecting statistics of mineral production during the calendar year 1911; and the active and prompt co-operation of all mining operators, brick makers, quarry owners, etc., is urgently requested.

The year 1910 was one of maximum output in the mining industry. During 1911, however, several factors—including particularly the closing down of the chief collieries in Alberta during a large part of the year, accompanied by the cessation of smelting operations at Grand Forks, B.C., will result in a lower production of coal, and of copper than might otherwise have been expected. The silver output of Cobalt, and the gold output of the Yukon have, on the other hand, continued to show satisfactory growth. The development—to the producing stage—of the Porcupine district, from which much was expected, has been delayed

by the disastrous summer fires that destroyed so many lives, and so much mine equipment in that district. The continued activity in building operations throughout the chief centres of population of the country would seem to indicate a successful year in the production of the various structural materials; including cement, lime, clays, stone, etc.

The usual routine work has been carried on in the Chemical Division under Mr. F. G. Wait and his assistants, Messrs. M. F. Connor and H. A. Leverin.

THE COAL TRADE OF NOVA SCOTIA DURING 1911 A RESUME

(Written for the Canadian Mining Journal by F. W. Gray.)

The year 1911 was one of the most prosperous in the annals of the coal trade of Nova Scotia, and outputs have returned to the point where they were interrupted in 1908 by the trade depression and the coming of the United Mine Workers of America.

The outstanding incidents of the year were the acquisition of the properties of the Cumberland Coal & Railway Company by the Dominion Steel Corporation, the collapse of the strike at the Springhill Mines, and the flooding of the Port Hood Colliery.

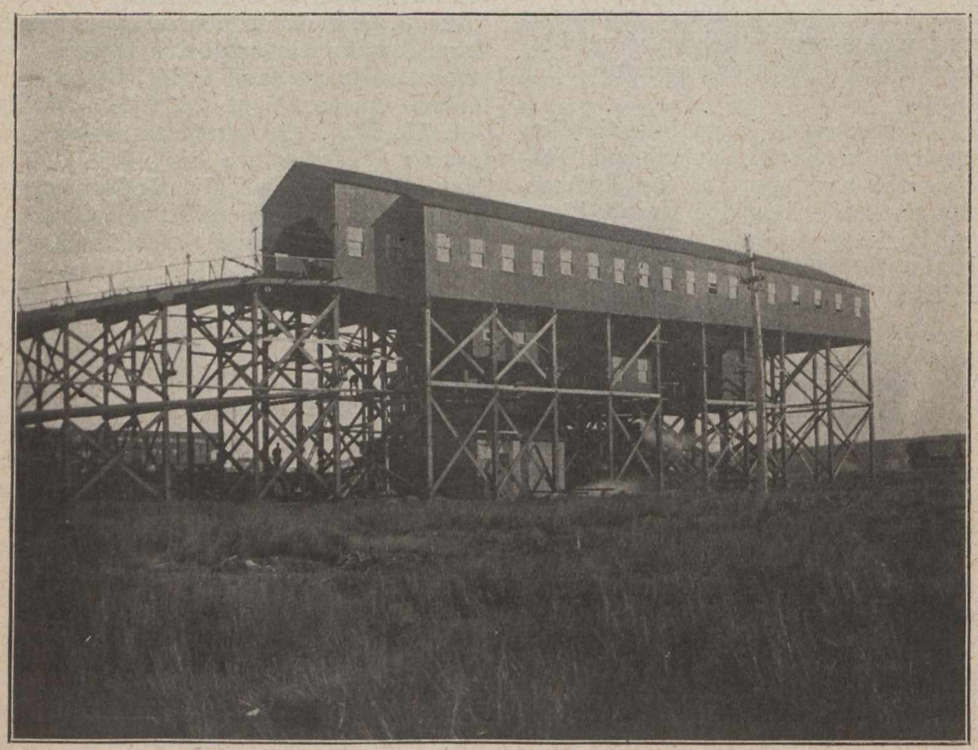
With the exception of the explosion in the No. 3 Colliery of the Nova Scotia Steel & Coal Company in January last, no accident occurred involving serious loss of life. The fatality rate at the mines was slightly higher than in previous years. Exact figures on this point are not yet obtainable, but the fatality rate will be about 2.6 per thousand men employed.

So far as can be estimated from the approximate figures available the coal output of Nova Scotia during 1911 will be near 6,300,000 tons. Of this tonnage 82 per cent. is from Cape Breton mines. The combined production of the mines controlled by the Dominion Coal Company and the Nova Scotia Steel & Coal Co. totals 80 per cent. of the output of the Province. The Dominion Coal Company themselves produced 68 per cent. of the provincial output.

The royalty payments to the Government of Nova Scotia for tonnage extracted in 1911 will approximate $700,000, a very satisfactory revenue from one industry. Great honour should be given in these days of realization to those statesmen who fought for and reserved to the people the potential revenues of Nova Scotia's mineral resources. Had a similar procedure been followed when the common lands of the United Kingdom were enclosed and granted to manorial lords, many of the financial difficulties which are to-day troubling the parliamentarians of Britain might have been mitigated.

The output of the Glace Bay mines of the Dominion Coal Company will be within a few thousand tons of four million tons, an advance of 440,000 tons on the output of 1908, the best previous year. The 1910 output was 3,526,754 tons. The new collieries in the Lingan district produced over 500,000 tons, or 13 per cent. of the company's output. In 1912 these mines should produce between 700,000 and 800,000 tons. Operations in the Lingan field were commenced in 1907 in a practically virgin area, and to have attained the present rate of output in a little less than five years is a creditable performance.

At the end of the year the Coal Company had ten collieries in full production in the Glace Bay field, two collieries in full production and two in process of development in the Lingan field; two collieries in the developing stage in the Morien field on the areas formerly



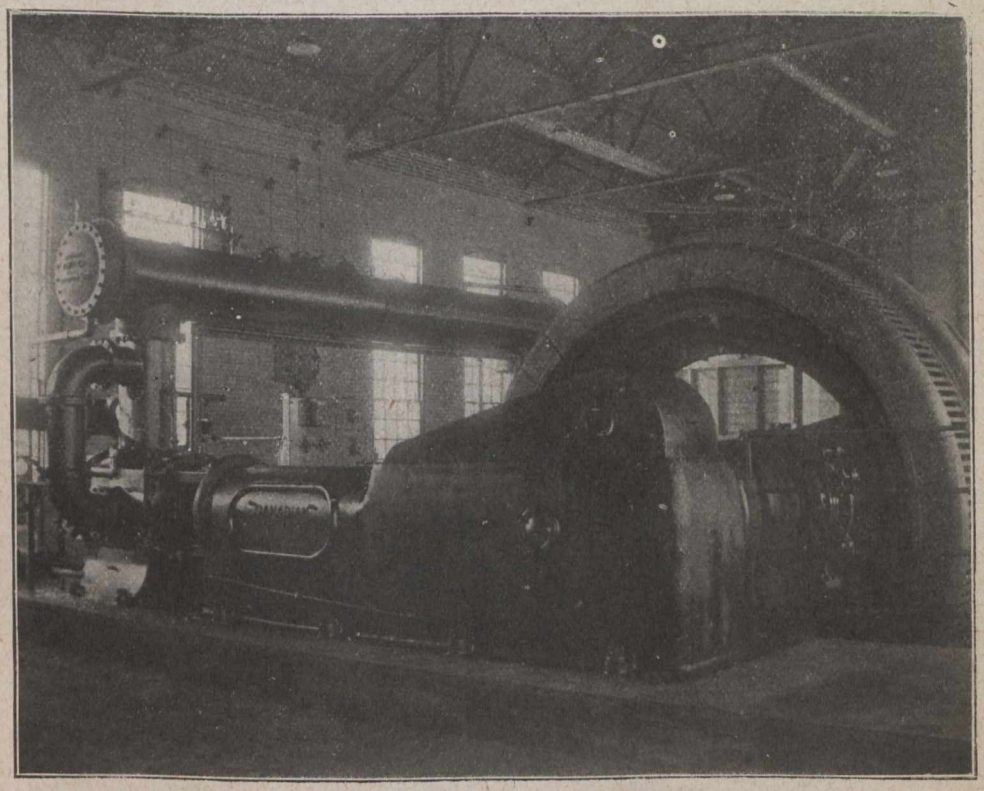
No. 4 Bankhead.

owned by the Cumberland Coal & Railway Company; or sixteen collieries all told. In 1912 it is probable that at least one other colliery will be commenced in the Lingan district. Next year a further increase in the Coal Company's production is contemplated, and an output of four and one-quarter million tons is a probability under normal circumstances.

The Coal Company has under way a large programme of extension. At Sydney a new shipping pier is under construction and will be completed during the summer of 1912. This pier is designed to accommodate the largest type of freighting steamer, and will be modern in every respect.

A Baum coal washer is also in course of erection near the new shipping pier. The work is more than half completed, and it is expected to have the plant in operation about May. It will have a capacity of 120 tons of washed product per hour. This is the first Baum washer in America. The plant is an expensive one in first cost, but has given remarkable efficiency in Europe. The main feature in which the Baum system differs from other jig washers is that the impulse to the washing water in the boxes is given by compressed air, instead of through the usual method of eccentrics and plungers. It is claimed that the Baum method gives more buoyancy, and that the product is washed with a minimum of waste. The plant is economical in the use of water and in the labour required to operate. The guarantees given by the makers ensure a well-washed uniform product, that should find a ready market. The design will allow for a second unit of similar capacity. The machinery will be electrically operated.

Practically all the new power equipment put in during the year was electrical. What really amounts to a comprehensive scheme of electrification has been carried out by the Dominion Coal Company during the past five or six years. The bulk of the pumping, ventilating and screening machinery in the Glace Bay field is now done by electric power transmitted from the No. 2 Power Station. On the Lingan side, the air compressors at No. 12 and 14 Collieries, the bankhead and screening machinery at No. 14, and all the ventilating machinery of Nos. 12, 14, 15 and 16 collieries are electrically driven. An electric hoisting engine for No. 14 colliery will be delivered next spring, and it is probable that the hoists for Nos. 15 and 16 collieries will also be electrically operated. The generators in the No. 2 Power House will not be sufficient for the expected load from the Lingan mines, and a contract has been let for the equipment of an additional power station to be situated near Waterford Lake. The projected installation will consist of a turbo-generator set, using live steam, with a nominal rating of 2,500 KW. The boilers will be of the Bettington type, the first installation in America. These boilers are fired by dust, injected by a blowing fan, and are claimed to be the most efficient steam-raisers yet put on the market. The steam will be delivered at 175 lbs. pressure with 150 degrees of superheat. All the calorific value of the coal is said to be obtained, and good results can be obtained with poor quality coals. The residue of combustion is an irreducible slag. The new station will be in electrical connection with No. 2 station and power will be drawn by the Lingan or Glace Bay divisions as requirements may be. The new collieries at Birch Grove will also be electrically operated, and the transmission line is already erected.



Electrically driven Air Compressors. Capacity 3,000 cu. ft. per minute.

The exhaust-steam turbine in the No. 2 Power House has run very satisfactorily throughout the year.

The Nova Scotia Steel & Coal Company's output was 780,000 tons, about 60,000 tons less than the 1910 production. The decrease was caused by the explosion at No. 3 Mine, previously mentioned. No output was obtained from this mine for a few months after the explosion, and some time elapsed before conditions were as favourable as before the explosion.

No important new plant was installed, with the exception of some improvements to the present plant in

the shape of more modern and effective steam raising appliances. The company has in contemplation the installation of a 750 K.W. turbo-generator set, with mixed-pressure turbine.

The management expect to considerably increase their coal output during the coming year.

The output of the Springhill Collieries for the year will be 270,000 tons. The twelve months has been taken up with the recovery of the mines from the condition they perforce fell into during the U. M. W. strike. The output increased and at the close of the year was running about 36,000 tons per month, or the same as before the strike. For 1912 the production should exceed 400,000 tons. A small air-compressor is being erected, and it is probable that some coal-cutting machinery will be introduced.

The territory outside the present slopes is being tested by a diamond drill, and if a suitable location can be proved it is the intention to open up an additional slope. It is also proposed to erect a shipping pier at Wallace, on the Northumberland Straits, and a railway branch is projected from a point near Oxford Station on the Intercolonial Railway to the pier at Wallace.

The output of the Inverness Coal & Railway Company will be near 280,000 tons, or about the same as last year. This company's sales have to some extent benefited by the stoppage of Port Hood Colliery. With both Port Hood & Mabou Collieries under water, the mines of the Inverness Coal & Railway Company are the only ones of any importance in Inverness County. A company incorporated in London, Eng., as the Margaree Coal & Railway Co., controls large coal areas known as the Ste. Rose property, and from time to time rumour has been busy with the proposed operations of this company, but up to the present time no development work has been undertaken.

The Acadia Coal Co. increased its output considerably, raising about 370,000 tons. The influence of the new capital from Belgium is now being felt, and quite extensive improvements are under way at the present time. This company has likewise undertaken an electrification at the Allan Shafts equipped with a turbo-generator set rated at 2,000 KW., using live steam, similar to those being installed in the Glace Bay field. At the Albion Mines a steel bankhead is being built to serve two seams. An air-compressor is being installed, it being the intention to use coal-cutting machinery. A wash-house for the use of the miners, designed on the Belgian plan, is being erected. Shower baths are provided. Pit-clothes and ordinary wearing apparel are alternately hoisted to the roof of the wash-house by a rope and pulley, as is the usual custom at European mines. A temporary hospital and ambulance house are also being provided.

As a result of these large expenditures a large increase in outputs is naturally looked for.

The output of the Intercolonial Coal Co., remains about the same as in 1910, namely 250,000 tons.

The North Atlantic Collieries did very little during the year, only raising some 23,000 tons. The Eastern Trust Company, as Trustee for the bondholders, fore-

Compressor House, No. 14 Colliery.

closed on the property, which, after successive postponements was sold by the Sheriff at auction in December, realising $70,000 only. The identity of the purchaser has not been made public.

Reviewing the work of the collieries generally, nothing in the year has been more striking than the improvement in the colliery power equipment. The substitution of electricity for steam has been general. Large economies are being affected by central generating stations using a combination of reciprocating and exhaust-steam turbine engines, or straight live-steam turbines. The power is transmitted long distances, and where there are a number of detached plants considerable economy is possible in the operation of pumping and screening machinery, where the power required varies and is affected by holidays and idle days. Apart from its economy, the use of electricity around the collieries eliminates the smoke and steam and much of the noise which is often so much in evidence, making the collieries and their surrounding villages much pleasanter places for all concerned, A properly

designed central power-station can effect great economy in fuel consumption, and in the utilization of inferior slacks and splint, which would otherwise cost money to place on the spoil bank.

The same improvement that has taken place in the colliery equipment and output has been noticeable in the arrangements for transportation. Freighting steamers of from 8,000 to 10,000 tons cargo capacity are no longer a novelty in the St. Lawrence coal trade. No additions of any importance were made by the Nova Scotia companies to their discharging plants in the St. Lawrence or in the ports of the Maritime Provinces. Considerable expenditure was made by United States coal companies in this respect in the competitive territory around Montreal, and the head-waters of the St. Lawrence, but this feature lies outside the scope of the present article.

The flooding of the Port Hood Colliery has been fully referred to in the columns of the Journal during the year. It is now the general opinion of those who have investigated the occurrence that the in-rush of water was not caused by any direct overhead fracture of the strata underlying the sea-floor. As a matter of fact, the sea-floor immediately over the point where the water came in is bare at low-tide, and it may also be stated that the hour when the water was first noticed would be about the time of low-tide. The evidence appears to point to the existence of an old river bed, which has been filled in with porous material, probably gravel overlain by sand. The present land surface overlying this concealed river-bed is above high-water mark, but the ancient channel may be near or at sea-level. Water may have followed down between the layers of the strata and have been held in the sandstone beds which are found above the coal. The inrush followed upon the drawing of pillars in the bottom level of the mine. It is not unusual in extracting pillars to have an inrush of water from overlying water-bearing strata, particularly if, as in the case of Port Hood, the break occurs at the lowest part of the workings. The rate of inflow at Port Hood was not greater than has been previously experienced in Nova Scotian coal mines, and the serious result of the inflow was caused by the totally inadequate pumping capacity and the lack of lodgement room. The pillar drawing which initiated the flooding was being carried on at a point distant only some 500 feet from the main haulage way. At the foot of the main haulage way the heading was driven down past the last level some 50 feet only, and this constituted all the available lodgement room.

On reviewing the circumstances of the flooding of Port Hood, therefore, the unfortunate occurrence does not present so serious an aspect as it did at first, so far as the physical side of the matter is concerned. The drawing of pillars at the near end of the level instead of at the far end was a reversal of the usual practice, and, as events have proved, it was a risky procedure to draw pillars in a 6-ft. coal seam, lying at a fairly high angle, in submarine territory, with no provision of lodgement room and inadequate pumping capacity. The truth of the matter is that submarine coal-mining is an expensive business and needs large capital outlay, and the use of methods of extraction which are slow in yielding profitable coal, necessitating as they do large expenditure on development work before any great quantity of coal can be taken out. The Port Hood Company had for some time been operating under financial difficulties, and they could not afford to provide the expensive pumping plant, the necessary expenditure on lodgement room and other things which with large capital they might have done. The property is a good one and has possibilities. With proper appliances the mine could doubtless be unwatered, but in any case the mine will always be an expensive one to operate.

Regarding the provisions made for safety of the mines, although nothing of an outstanding nature has occurred during the year, the tendency of everyone concerned with the coal industry is to increased precautions. The Commissioner of Mines sent a representative around the collieries during the summer to make tests of the quality and humidity of the mine air, and to ascertain the amount of coal dust in suspension. It is understood that further tests will be made during the winter, so that a comparison may be instituted between the relative humidity of the mine air in the summer as compared with the winter. Several of the coal companies have equipped their mines with hygrometers, and are following this matter up.

Legislation was proposed in the spring forbidding the use of any naked lights in the mines of the province, but the regulation has not as yet become law.

The Nova Scotia Steel & Coal Company purchased additional Draeger helmets and accessories shortly after the No. 3 explosion. The Dominion Coal Company did not make any additions to its equipment, with the exception of an electrically operated refill pump for charging oxygen cylinders. The new Rescue Station which is intended to serve the Lingan collieries is completed. The equipment will be purchased early in 1912. It is probable that the Coal Company will also equip their Springhill Collieries with breathing apparatus and fire-fighting appliances. The Acadia Coal Company is erecting a Station with smoke gallery and observation chamber, and is equipping it with breathing apparatus.

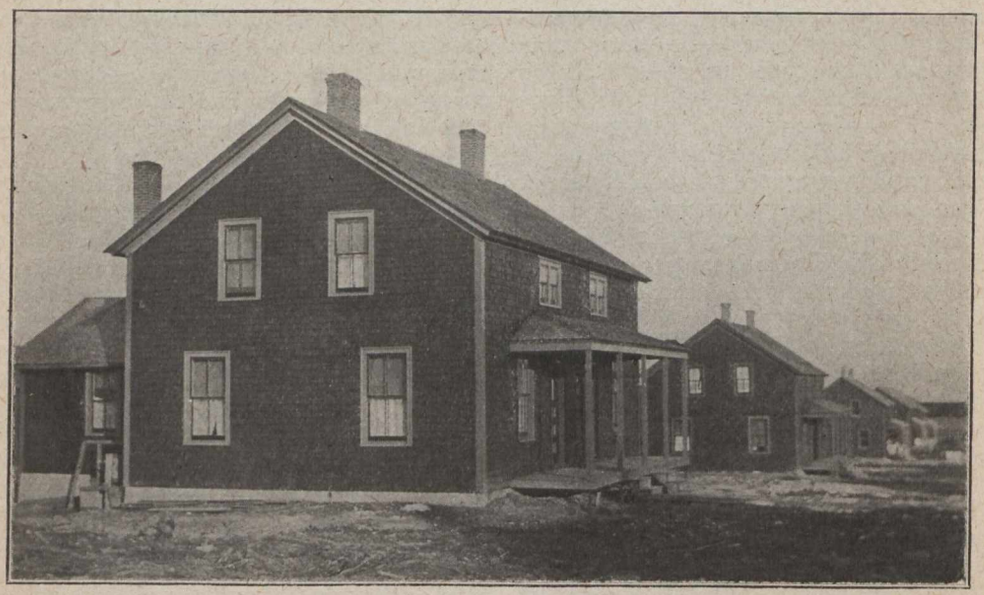
A central Joint Rescue Station for the Mainland collieries was mooted two or three years ago, and it was thought the Provincial Government would assist the operators in providing such a station, but apparently such a scheme has fallen through. The bigger companies will doubtless see the wisdom of providing for themselves, but the smaller companies will not be able to afford suitable provision. Nova Scotia led the way, and had the first properly equipped Rescue Station and trained rescue corps in America, but to-day she lags behind. British Columbia and Alberta have outstripped us, and in the United States most enthusiastic interest is being taken in everything that pertains to mine rescue work and first aid instruction. The time has passed when breathing apparatus was an experiment and under suspicion of being a fad. Hardly a month passes but it is used to fight fires and the results of mine explosions, and it is to-day as much an accepted part of the fireman's equipment as the hose and nozzle. Considering the income from coal royalties the Government could very well afford to aid in this work, particularly as in so doing they would be safeguarding their most valuable source of revenue.

The Dominion Coal Company Employees Benefit Society had its first full year of operation and is working out in a manner that promises well for the future. The membership has increased from 6,000 to over 10,000, and includes practically every employee in Cape Breton and at Springhill. The Society has dependent on it 54 widows and 238 children. The amount disbursed in sick and accident relief was $56,500. The sum of $18,000 was paid in relief to widows and children, and $23,000 was laid aside to cover the future benefits which will accrue to widows and children who came on the fund during the year. The gross income was $120,000, of which $52,000 was contributed by the workmen, $52,000 by the company and $11,000 by the Government. The

expenses of management amounted to $4,000. It will be seen that the expenses of managing are small compared with the income, and, under the consolidation of the funds, the Society's interest on its investments is sufficient to cover the working expenses. The Society is managed conjointly by representatives of the workmen and the company, but its real management is conducted by the workmen themselves, and it is due to the community of interests and the care exercised by the members themselves in passing claims that the Society is prospering. The total gross assets at the end of the year amounted to $134,000, of which sum $75,000 is laid aside as a Reserve Fund to insure stipulated relief payments to dependents, and $25,000 is placed to the credit of the Old Age and Disability Fund. The proportion of sickness claims to those arising out of disability caused by accident have been about the same under the new Society as was the experience under the old societies, namely that the accident claims were only half the number of those arising from sickness.

The year saw the close of the last of the abortive strikes which were called by the United Mine Workers of America, and it is to be hoped that this dark chapter of trouble is finished. During the first part of the year the strike at Springhill dragged along very wearily. The announcement that the Dominion Steel Corporation had obtained control of the Cumberland Coal & Railway Company was made towards the close of 1910, and early in the year the Springhill Collieries were attached to the properties operated by the Dominion Coal Company. The new management took immediate steps to police the mines and to afford protection to the workers. Up to this time the strikers' pickets had virtual control of the town, but the evident determination of the company to work its mines, despite imtimidation, exposed the inability of the local authorities to keep the peace, and a situation arose which necessitated the intervention of the Provincial Government. On the 3rd of April the town of Springhill was placed under the control of a Police Commissioner, who had a force of 30 constables under him, and a quick end was put to the forcible intimidation which the U.M.W. had so long carried on. It had long been apparent that the majority of the strikers were tence of their organization in Nova Scotia. In April they requested the coal-owners of the Province to meet them in joint conference to discuss a wage schedule governing all the coal mines of Nova Scotia. The coal-tired of the useless struggle, and wished to return to work, but were deterred from doing so by the fear of physical violence. As soon as this fear was removed by the presence of the Commissioner and his force, the strike collapsed, and the men sought terms through the intervention of the Government. After having been on strike for 22 months, the strikers returned to work on practically the same terms that had been open to them from the commencement of the trouble.

The Provincial Workmen's Association renewed its Agreement with the Dominion Coal Company for a further period of two years, carrying the present understanding to the end of 1913. The local leaders of the U.M.W. have attempted to hold meetings to condemn the action of the P.W.A., but without much success, as the native organization has gained in strength by the abortive strikes of the U.M.W., and in renewing this Agreement the officers of the P.W.A. had the approval of the great bulk of the company's workmen.



Miners' Houses at No. 14.

The U.M.W. officers have throughout the year attempted to impress the public with the continued exis- owners did not respond. When it is stated that not a single local of the U.M.W. of America in Nova Scotia was at the end of the year in sufficiently good standing to vote on the election of the International officers, the pretence of their leaders to speak for the workmen of the province needs no further exposure.

The natural dislike of all thoughtful Canadian trade-unionists to control from the United States has been crystallized by the revelation of the McNamara dynamitings, and the feeling that the American Federation of Labour has not cleared itself of complicity in these organized evil developments of militant unionism. It is still remembered that the coming of the U.M.W.A. to Nova Scotia was followed by riots, dynamiting and murder, accompanied by cynical and unblushing "graft", and a general lowering of morals. The organizers of the U.M.W. preach openly the doctrines advocated by Haywood of Colorada, namely, the "total abolition of the wage system" and the coming of the "social revolution", which they would help along by so-called "active" means, to use the hypocritical jargon of their propaganda, or, in other words, by civil war. It is small won-

der that the cautious Nova Scotian sees in these agitators a menace to the legitimate aims of labour, and prefers his own methods, which, though neither so sensational nor so "slick", are infinitely more likely to accomplish the wished-for end. The recent resolution of the A.F. of L. in Atlanta, Georgia, condemning the P.W.A. in vituperative terms, will not tend to mollify the indigation of the Nova Scotian unionist.

Although the present summary deals particularly with the coal industry, yet this is so connected with the steel industry, that some reference to the last-named is almost necessary.

The Dominion Iron & Steel Company has put into operation during the year 120 new bye-product coke ovens, and has now in operation an exceedingly fine coking plant, to describe which would require a separate article. The ovens are an improved Otto-Hoffman type, with higher and longer and slightly narrower coking chamber than the other ovens of the Steel Company. They give a yield of coke approximating 67 per cent. The bye-product plant has so far given excellent results. Everything in the new installation is of the most modern construction, and very substantially built. The ovens are charged, levelled and drawn by electrically operated machinery. The huge quenching machines lift off the oven door, receive the coke as it is pushed out by the ram, quench and break it up, and deliver it into cars.

The Steel Company has now four blast furnaces in operation, and expect to blow in the new furnace, No. 5, about February. A sixth furnace is under construction, so that the coal requirements are steadily increasing.

A corresponding increase is needed in the ore and limestone deliveries. The output of the Steel Company's Wabana mines in 1911 was roughly 564,000 tons, about 4,000 tons larger than the 1910 output. It is expected to get 750,000 tons of ore from Wabana in 1912.

The linestone quarries at Marble Mountain, Cape Breton, produced 435,000 tons, breaking all previous records by 60,000 tons. In addition to the Marble Mtn. quarries the Steel Co last spring opened a quarry at Ball's Creek, near Sydney, from which they obtain suitable limestone for the open hearth furnaces. This quarry will probably produce 40,000 tons in 1912. The dolomite quarries at George's River will produce about 20,000 tons. In order to meet the increased demand consequent upon the starting of the new furnaces, the Steel Company is opening up a limestone deposit on the shores of Port au Port Bay on the West Coast of Newfoundland. The work is now proceeding and before long the new quarries will be large producers.

A reference to the allied industries may not be out of place. The Dominion Tar & Chemical Company takes the tar and pitch from the Steel Company's ovens, and mages a remarkable variety of tar products, for which they have no difficulty in finding a market. During the year the Chemical Company added a creosoting plant, in which the piles for the Coal Company's new shipping pier and for the general construction work of the allied companies have been treated.

The Sydney Cement Company, whose product is manufactured from the Steel Company's slag, has kept up a steady production of both cement and pressed cement bricks. The Steel Company's new offices, the various new power-houses of the Steel & Coal Companies, and a large Academy in Sydney have been constructed of these bricks, and both cement and bricks have found a large local consumption.

During the year a large plant has been constructed in Sydney by Alex. Cross & Sons of Scotland for the making of slag fertilizer out of the Bessemer slag of the Steel Company. The fertilizer is simply finely ground slag without any admixture. The market for this latest bye-product will have to be largely created, but once the merits of the fertilizer are understood, the agricultural industry of the province should provide a ready outlet.

With the large additions to the Steel Company's plant such as the nail-mill, etc., this summary will not attempt to deal, as they will doubtless be fully reported elsewhere, and reference has been made merely to matters which directly touch the coal industry. Suffice it to say that the Steel Company's plant and operations are being practically doubled. The Nova Scotia Steel & Coal Co. is installing a fluid compression plant for ingots, at the Sydney Mines Works, and a hydraulic forging plant at New Glasgow.

THE NATURAL HISTORY OF HARTZ-FOREST*

(Written for the Canadian Mining Journal by J. C. Murray.

I have before me a small volume, printed in 1730, in the reign of His Majesty King George the Second. The title-page is exhaustive, in accordance with the pleasant habit of the time. The book is a translation from the German of H. Behrens, M.D., and the translator is John Andree.

Andree's dedication to the Prince of Wales is rich in humility

To
HIS ROYAL HIGHNESS
FREDERICK
PRINCE OF WALES
These Sheets
Are Dedicated with all
Possible Submission
By
(May it please YOUR ROYAL HIGHNESS)
YOUR ROYAL HIGHNESS'S
Most Obedient
Most Devoted, and
Most Humble Servant,
JOHN ANDREE.

It would be difficult indeed to compress within the limits of one page a more complete declaration of humble devotion.

To the reader Mr. Andree explains in a prefatory note his purpose in publishing the translation. The note opens thus:—

"That Branch of Learning call'd Natural History "has this advantage, that it suits the Genius of Men "in a more peculiar manner than any other Science "whatever: For whilst we inform ourselves of the "State of Nature in any part of the Globe, we are at "the same time agreeably entertained by the Variety "of Objects, and our Spirits are insensibly elevated by "adoring the Power of that Being which produced "those wondrous Works. But it will be needless to "say much in its Commendation, when we consider "that the several Societies of Learned Men, which

*My thanks are due to Dr. W. L. Goodwin, Director of the School of Mining, Kingston, Ont., through whose courtesy I have obtained temporary possession of the book on which this article is based.

"have been establish'd in sundry Parts of Europe, "have thought it worthy their particular Application "to impress this part of Knowledge, and cultivated it "with uninterrupted Assiduity, and that in order to "collect a True and Compleat Natural History they "encourage all Performances of this kind.

THE

Natural Hiſtory

OF

Hartz-Foreſt,

In His Majeſty King GEORGE's

German Dominions.

Being a ſuccinct

ACCOUNT

OF

The Caverns, Lakes, Springs, Rivers, Mountains, Rocks, Quarries, Foſſiles, Caſtles, Gardens, the famous Pagan Idol *Puſtrich* or *Spit-fire*, Dwarf-holes, Pits, moving Iſlands, Whirlpools, Mines, ſeveral Engines belonging to them; Ores, the manner of refining them; Smelting-houſes; ſeveral ſorts of Ovens, Hammer-mills, Vitriol and Glaſs-houſes, &c. in the ſaid Foreſt: With ſeveral uſeful aud entertaining Phyſical Obſervations.

Written in *German*

By H. BEHRENS, M. D

LONDON,

Printed by *W. Pearſon*, for T. OSBORNE in *Grays-Inn, Holbourn.* 1730.

"Upon these considerations I doubt not but the "Reader will conceive a favourable Opinion of the "present Undertaking, it being the only set Treatise "that has been wrote upon the Curiosities of this "Country; where Nature seems to have done her Ut-"most, to make Amends, as it were, for the disadvan-"tage of its Infertility."

You will be reminded by the title-page that the Hartz-Forest was part of the dominions of the august King George.

That the reader may not hold up his hands in horror at some of the tall stories told by Herr Behrens, the translator instructs him thuswise:—"But if the Reader "should find fault with some Accounts, which savour "too much of Superstition, I must desire him to observe "that they are inserted here to set forth the Genius of "the Inhabitants of the Country, and not as the Au-"thor's own Sentiment, he being so remote from giving "Credit to Romantic Tales, that he relates 'em with "abundance of Caution, and takes particular Care to "distinguish 'em from Truth."

"The Caverns" the preface continues "which the "Author begins with are deservedly admired by all "Curious Persons. There are various Opinions about "their Original: Some say they had been Quarreys; "others take 'em for Mines; . . . and lastly, some affirm "they were accidentally framed by Earthquakes; not "to mention the ridiculous Doctrine of Paracelsus and "others, who advanc'd, That a particular Race of Men, "which were neither altogether Spirits nod human Cre-"atures, but between both, had prepared those Cavities "for their Abode." The translator scoffs also at the supposition that these historic caves were the work of men. He derides as folly the idea that the ancients would have fetched "Stone with unspeakable difficulty "so far under Ground, when great plenty of it is to "be met with in most parts of that Country." It is explained, moreover, that "our Author (Herr Behrens) ". . . . essayed some yellow Matter found in one, call'd "the Hegers Horst, which People imagin'd to be Gold "Ore, but obtain'd nothing metallic." From these and other considerations John Andree pins his faith to earthquakes. "And, that Earthquakes, or any subter-"raneous Commotions, are capable of making such "Cavities, appears plainly from the subsidence of "Ground, which has occasion'd so many Lakes in that "Country; for before the surface of the Ground could "sink, there must necessarily have been a Cavity un-"derneath it before."

The translator crosses swords with the author when the latter embraces "the Doctrine of the Philosophica "Burgundica" as to the cause of springs of water on the summits of mountains. The author's conclusion in this matter is worded thuswise:—"Wherefore the most "plausible Opinion to me is, that the Water, being "rarify'd by the Subterranean Heat, rises in the na-"ture of a Vapour till it gets to the Summit of the "Mount, where the external Air condenses it into "Water."

"But," argues the translator "in my humble opinion "that Phoenomenon is better accounted for from the "Principles of Hydrostatics. For 'tis known, that "when two Fluids of different gravities are put into "a bent Syphon, there must be a higher Column of the "lightest to counterbalance the heaviest: Now if the "excess of the difference between the gravity of salt "and fresh Water be in proportion to the excess of the "Mountain's height above the Sea, what should hinder "Springs from bursting out there?"

Having thus disposed of the Philosophica Burgundica, Mr. Andree passes lightly over some nature faking until he arrives at the "Divinatory Rod." "The Story "of the Enchanted Hall, I doubt, will give the Reader "some Offence. As I have made already above an "Apology for Stories of that nature in general, I will "only insert here concerning the Passage of the Divin-"atory Rod, from my own Knowledge, that Dr. Weitz "(an experimenter referred to in the text) was about "23 Years of age when that happen'd to him, and in "company with other Students. Now, whether what "passed there might be the Effect of Imagination, or "of Fear, considering it was in the Day-time, and they "were all in the prime of their Vigour, I leave the "Reader to judge." The hair-raising experience of

Dr. Weitz will be narrated later on. Meanwhile, the non-committal Mr. Andree is to be admired.

Not until the Hartz Forest was found to be rich in mineral wealth were the bloody freebooters expelled. Of this expulsion the translator says:—"Which how it "was effected, and in what manner best part of this "Country came to the Line of Hannover, may easily be "learnt from History, but would be too tedious to "mention here."

And now to mining:—"With respect to the Mines, "this District is counted the richest Spot of Ground "in all Germany; for here are more than One hundred "and ten Capital Mines, several of which have Small "ones belonging to them: Some are work'd for the "King of Great Britain (as Elector of Hannover), his "own Account, and the rest farm'd out. The Mines of "Wildman Clansthal, Zellefeld, Lauenthal, St. Andre-"asburg, etc., are Silver ones, and some of them so rich "that Nine hundred thousand Rixdollars have been "coin'd in One Year from that of Clauthal only. This "Mine of Clausthal was discovered in the Year 1045, "and that of Lellerfeld in 1070. The Overseer, who "pays the Miners every Saturday, Keeps his Court at "Wildman, it being almost in the midle of them."

"The principal Produce of those Mines are Silver, "Copper, Iron, Led, and Litharge. They have many "other Minerals here, which yield also a great deal of "Money, but are very dangerous to Workmen, because "of the poysonous Vapours; as, grey Vitriol, the Ink-"stone of several colours, another sort of Vitriol solid "growing like Icicles, white Vitriol from Led Ore, Misi "of the nature and colour of Brimstone, etc.

"These are what I thought necessary for an Intro-"duction to this Work, which our Author had neglect-"ed in his Preface, he only making an Apology (the "spelling is Mr. Andree's own) there for printing the "Book, and recommending it to the Publick." This finishes the philosophical Mr. Andree. It remains to select a few passages from the text of Herr Behrens.

The greater part of the book is made up of descriptions, not impressively veracious, of the natural features of the Hartz Forest. In the Index are listed such topics as "Blackberries that intoxicate," "Beer tast-"ing like Wine," "Enchanted Hall at Walkewried," "Fossile curing Witchcraft," "Idol Pustrich, or Spit-"Fire," "Iron turn'd into Copper," "Wolfs, how "catch'd alive," and so on.

Chapter II, Part VI, contains most of the allusions to mining and metallurgy. The legend of Rammelsberg mine is here sketched most quaintly. "The Mountain "Rammelsberg lies Southerly of the Imperial City of "Goslar. 'Tis a high, large, and on the outside un-"fruitful Mountain, Towards the top 'tis wrent in a "surprizing manner, and there is a Cleft which in some "places is from 6 to 8 foot wide, and 100 fathoms long, "but of such a depth that the bottom is invisible, which "according to the Report of the Miners, grows bigger "every Year. . . . . Some think it happen'd when, as "the Saxon Chronicle relates, the Mountain sunk, and "made in one Day 350 Widows (a cheerful way of ex-"pressing it!) which in a body went towards it bewail-"ing their Husbands (who were buried in the Mines) in "a most deplorable manner."

The name Rammelsberg was given the mine in the following manner. When Otho, Emperor of Germany, was holding his court not far from Goslar, he ordered one day his huntsman to chase a buck. Finding that his horse could go no further up the mountain, the huntsman proceeded on foot, having securely tied the horse to a tree. History does not record the fate of the buck; the action being centred round the horse. "In "the mean time the Horse, impatient for the return of "his Master, raked the Ground with his Feet, by which "means he laid bare a Metallic Vein; which the Hunts-"man perceiving, carried a piece of Ore to the Emper-"or, who had it try'd, and thereupon began to dig "Mines there. The Huntsman's name being Ramm, "the Emperor order'd the Mountain to be call'd after "his Name Rammelsberg."

This reminds one of Larose and the fox, and of many other local Canadian legends.

A wonderful variety of minerals were found at the Rammelsberg mine. They include "Glittering Ore, "brown-Lead Ore, common Ore, white-Copper Ore, yel-"low Copper Ore, Copper-stone, Flinty Glimmer, white-"grey Flint, greasy Ore, red and grey Inkstone, white "and green solid Vitriol. . . . grey Copper Ore, yellow "Misy of the nature of Brimstone, yellow Oker, Talk, "and Roch-Alum. From these Minerals are separated "several Metals; as Gold, (but as the Mark of Silver "holds but one Farthing's worth of it, it doth not an-"swer the Expences to separate it) Silver, Copper, "Lead, Spelter, Brimstone, Cobalt, blue and white Vi-"triol, etc." From this schedule of metals the reader will be guided in guessing at the identity of the minerals.

Explosives were not used. "The Ore is sometimes "too hard for the Miners Tools, which obliges them to "make Fire about it, by which it grows brittle, and is "easily dug up. Whilst the Fire lasts, there is such a "heat in the Mines, that the Miners work quite naked; "so much the more, because the Water in these Mines "is of a Vitriolic nature, and so sharp that it corrodes "their Cloaths." It may be wondered what that same water did to the miners' superficies!

(To be continued)

PERSONAL AND GENERAL.

Mr. H. Mortimer-Lamb, secretary of the Canadian Mining Institute, called upon the Hon. Mr. Hearst, Ontario Minister of Mines, on January 5th, to discuss matters connected with the next Annual Meeting, which is to be held at Ottawa.

Mr. O. L. Dickeson has been appointed general manager of the White Pass and Yukon Railway, and president of the local companies.

Mr. C. N. Milne, lately connected with the Preston East Dome, is at present in Toronto.

Mr. Clifford Smith spent the Christmas holidays in Brockville. He is at present at the National Club, Toronto.

Mr. S. N. Graham, who is now attached to the Department of Mines, Ottawa, recently visited Washington and New York on official business.

Dr. W. G. Miller and Mr. C. W. Knight attended the twenty-fourth Annual Meeting of the Geological Society of America, held at Washington, D.C., on December 27, 28 and 29th. Director R. W. Brock, Mr. D. D. Cairnes, Mr. J. B. Tyrrell, Dr. T. L. Walker, Mr. W. A. Parks, Mr. W. F. Ferrier, Dr. A. P. Coleman, Prof. M. B. Baker (Kingston School of Mining), Prof. Wm. Nicol (Kingston), Dr. F. D. Adams (McGill), and Dr. A. E. Barlow, were included in the Canadian contingent.

At a recent meeting of the Dome Mining Company, Mr. Ambrose Monel was elected president.

Mr. J. W. Astley has returned to Toronto after having concluded an examination of an important mining property in Eastern Ontario.

Major R. Leckie, Sudbury, was in Toronto shortly after Christmas.

Mr. Reginald Hore, Houghton, Michigan, spent several days in Toronto shortly after New Years.

Mr. E. T. Corkill, Inspector of Mines for Ontario, on information laid by Mr. T. Sutherland, Assistant Inspector, caused Mr. J. W. Vandergrift, manager of the Lucky Cross Mine, Swastika, to be arraigned before Magistrate Hartman, on Dec. 15, for violating the Mines Act. The specific offence charged was that Mr. Vandergrift had neglected properly to protect the collar of the main shaft. A fine of $100 and costs was imposed, with an option of three months hard labour at North Bay.

MINING IN ONTARIO, 1911

(Written for the Canadian Mining Journal by Thos. W. Gibson.)*

Cobalt and Sudbury have given Ontario pre-eminence in the mining industry among the confederated provinces of the Dominion. From the beginning her fertile soil made her easily first in products of the farm, and her extensive forests put her in the van for lumbering, a position which she still retains, but it is only of recent years that Ontario has really come to be regarded as a mining province. Yet in 1910 of a total mineral production for the whole of Canada of $105,000,000, Ontario was responsible for about $43,000,000, or 41 per cent. This, too, in spite of the fact that nature has been so unkind as to deny her workable coal deposits.

The fact is that there are few countries in the world which have a longer or more varied list of useful minerals than Ontario. Of the chief commercial metals, iron, copper, gold, silver, lead, and zinc are found within her boundaries, the only absentee being tin. Petroleum, natural gas, salt, and gypsum are contained in her stratified rocks. The older formations, especially the Pre-Cambrian, are the home of her metals and of the other substances valuable for industrial purposes. Mica, of the amber or phlogopite variety, noted for its flexibility and resistance to the electrical current; graphite, for use in the manufacture of lubricants, stove polish, etc.; feldspar, which the potteries of New Jersey and Ohio, the makers of enamelled-ware, and even the manufacturers of artificial teeth find so useful; talc, which finds its way not only into the coated papers for illustration purposes, but also into the powder box of my lady's toilet; corundum, whose sharp bite is used by the foundry man in paring down his castings; arsenic, for insecticides and glass making; quartz, for silica compounds, and iron pyrites, for the manufacture of sulphuric and other acids, are all the bases of important local industries.

In addition to these and other products, Ontario abounds in materials of construction. It is a fortunate for comfort that in this northern climate clay for the making of brick is plentiful, and the towns and cities of the province present an appearance of solidity and durability entirely wanting in the frame-built cities of many parts of the United States. There are inexhaustible deposits of limestone for building, for lime-making, and also, where it is of suitable composition, for the manufacture of Portland cement. As an ingredient of cement, compact limestone is now largely displacing marl, which was formerly used for this purpose. There are granites for paving and monumental use, sandstones for building, and lastly, beds of marble only recently developed of surpassing beauty and great variety. The mineral wealth which nature has stored in the rocks of Ontario is serving and will serve a most useful purpose, not only in ministering to the wants of her inhabitants, but also in assisting to settle the great stretches of arable land covered with timber which form her northern heritage.

*Deputy Minister of Mines for Ontario.

Nickel.

The nickel industry has its seat in the Sudbury district. The ore is essentially a pyrrhotite and carries both nickel and copper. Mining was first begun about 1884, the ore being first regarded as one of copper, but difficulties in refining led to the discovery that it carried nickel. The industry, though steadily growing in quantity of output, has for a number of years been in the hands of two companies, the Canadian Copper Co. and the Mond Nickel Co., the former an American and the latter an English concern. The Canadian Copper Company formerly worked the Copper Cliff, Evans, Stobie, and Frood mines, but now takes most of its ore from the Creighton and Crean Hill. The Creighton mine is probably the most valuable nickel mine in the world. It is worked as an open quarry and from 800 to 1,000 tons of ore are raised per day. Crean Hill is more valuable for copper than for nickel, while the Creighton ore is the reverse. The smelters are at Copper Cliff, and are of the most modern and up-to-date character. The Mond company's works are at Victoria Mines, but are in process of being removed to a point east of Rumford where the Canadian Northern crosses the Canadian Pacific. Both companies operate their mines and works now almost entirely by electrical power, derived by the Canadian Copper Company from the Spanish, and by the Mond Nickel Company from the Vermilion River.

The combined output of nickel in 1911 is estimated to have been about 18,000 tons, slightly less than in 1910. The demand at the close of the year, however, was active, and both companies are working at their full capacity. The ore is roasted in heaps to get rid of the sulphur, then put through the blast furnace and subsequently converted into Bessemer matte containing about 45 per cent. nickel and 35 per cent. copper. The mattes are refined by the Canadian Copper Company in New Jersey, and by the Mond Nickel Company in Wales. The only serious rival to Ontario in the nickel industry is New Caledonia, a French island in the southern Pacific Ocean. The New Caledonia ore is quite different from that of Sudbury, being a silicate, and carries no copper. Formerly it was exported to England, Germany, and France for treatment, but works have recently been erected for converting the ore into matte before shipment, thus avoiding freight charges on useless material. Discoveries of rich nickel ores have recently been reported from Greece.

Silver.

There have been three eras of silver production in Ontario, the first beginning with the discovery of Silver

Islet, where out of a speck of land off the north shore of Lake Superior, about $3,500,000 worth of silver was extracted. Silver Islet mine has a romantic story, but long ago filled up with water and remains so to this day. Other discoveries followed on the mainland west of Port Arthur, where the Rabbit Mountain, Silver Mountain, Beaver, Badger, and Porcupine mines were worked in the days when silver was worth twice as much as it is now. In 1903 the silver discoveries at Cobalt astonished the world by their richness. The mines were opened in 1904 and the production quickly rose from 250,000 ounces in that year, to 31,500,000 ounces, the estimated output of 1911. In all, up to the present time about 125 or 126 million ounces of silver have been obtained from Cobalt, worth about $65,000,000. The ore-bearing formations are conglomerate, diabase, and Keewatin. Much the larger number of the productive veins occur in the conglomerate, but excellent ore has been found in the other two varieties of rock. The veins vary in width from a fraction of an inch to a foot or more, and in length up to 700 or 800 feet. Their vertical dimensions are less easily ascertained, but at the Temiskaming mine good ore has been obtained at 575 feet in depth. Recent developments in the geology of the camp have shown that an important fault occurs in the conglomerate on the La Rose, Cobalt Lake, and McKinley-Darragh properties. The effect of this is apparently to enlarge the area of workable ground on these claims, and it is possible that further operations may disclose ore at much greater depth than had formerly been deemed probable.

For 1911 the producing mines were much as in previous years, Nipissing, La Rose, Coniagas, Kerr Lake, Crown Reserve, Buffalo, Hudson Bay, etc., etc. In some of the productive mines of Cobalt the shareholders have received back again in dividends more than the amount of the original stock, and the total return to the shareholders has been greater than 50 per cent. of the gross receipts from silver sold, that is to say, out of $65,000,000 worth of fine silver produced, upwards of $33,000,000 has been paid in dividends.

The camp is making rapid progress in concentration and refining methods. At the start nothing was shipped but high grade ore, and the low grade material went to the dumps. Now there are some fourteen concentrators at work, and two others in course of construction, having a capacity of about 1,400 stamps in all. Most of the low grade ores, that is those containing from 20 ounces upwards, are concentrated, though there still continues a demand for low grade ore from western smelters in need of silicious material for fluxing purposes.

It may be that the highest point of production in Cobalt has been reached, but there is no apparent reason why silver should not be produced in very considerable quantities for many years to come.

The outlying camps—South Lorrain on the east, and Gowganda on the west—have been less productive than Cobalt, but Wettlaufer on the one hand, and on the other Millerett and Miller Lake-O'Brien, have been fair producers. The extension of the T. & N. O. branch into Elk Lake should stimulate the silver industry on the Montreal River, where concentration methods are likely to be in demand from the beginning.

From the other minerals in the Cobalt ores—arsenic, cobalt, and nickel—the mine owners have derived little benefit. The price of arsenic has fallen to two cents a pound and less, and the price of cobalt oxide has sunk to a low level, less than one-third of the figure at which it stood when Cobalt was discovered. Most of the high grade ores and concentrates are now refined in Ontario, there being four well-equipped refining plants, situated at Copper Cliff, Deloro, Thorold, and Orillia. Silver bullion is being shipped not only from these works, but also in increasing quantities from the camp itself. O'Brien and Nova Scotia have been producing merchantable bars for some time, and during the year were joined by Nipissing, which developed a novel and ingenious modification of the amalgamation process for recovering the silver. The price of silver during the year showed comparatively small variations; it opened at 52.79 cents per ounce in January and closed at about 54.5 cents. The market for Cobalt stocks remained dull throughout the year and prices are now at low levels.

Iron.

Slower progress is being made in developing the iron ore industry of Ontario. The ranges of iron formation in the north and northwest are extensive, but the bodies of workable ore as yet located are comparatively few. The Helen mine and Magpie in Michipicoten, Atikokan west of Port Arthur, and Moose Mountain north of Sudbury, are types of such deposits, varying in character and differing probably in origin. The hematite ores from the Helen are being smelted at Sault Ste. Marie. At Magpie and Moose Mountain plants are being installed for raising the grade of the ore as mined, and the ore from the Atikokan is roasted before going into the furnace. The iron mines of eastern Ontario made no shipments during the year. It is probable that concentration methods will eventually be employed for the treatment of these deposits, preferably by a suitable plant centrally located. The ore shipped amounted to probably 300,000 tons for the year.

Copper.

In copper the only productive source at present is the Sudbury district, the ore of which carries copper as well as nickel. About 9,000 tons of copper were contained in the mattes produced by the nickel companies in 1911. There are numerous deposits of copper ore in the district between Sudbury and Sault Ste. Marie, also in other parts of the Province, which do not carry nickel, but the low price which for some time has prevailed for copper, does not offer sufficient inducement for the working of these mines, the ore of which for the most part is low grade, and is carried in a silicious gangue.

Gold.

Gold mining is entering upon a new stage in Ontario. Hitherto, it must be confessed, the history of this branch of mining has been disappointing. Gold is found scattered over many parts of the Province, especially in the north and northwest, but the high hopes which have been raised by successive discoveries have, one by one, been doomed to disappointment. Madoc, Lake of the Woods, Seine River, and lesser camps have had the same experience. Porcupine, however, where gold was found two years ago, is holding out greater promise, and would, no doubt, have been producing bullion ere now had it not been for the forest fires which ravaged that district last July and which destroyed the plants at the Hollinger, Dome, and other mines. There is no doubt that large bodies of gold-bearing quartz exist at Porcupine, and as the Hollinger and Dome mills will shortly be dropping their stamps, gold bricks will be in evidence during 1912. The Ontario Government has met the urgent necessity for improving transportation into Porcupine, by build-

ing the T. & N. O. extension from Iroquois Falls. At Swastika, Munro, and Larder Lake developments have been going on, and bullion is expected from all of these places this year. At Sturgeon Lake, the St. Anthony mine, which lay idle for some years, has been taken over by a Toronto syndicate with very good prospects for success.

The list of metals in Ontario was extended during the year by the discovery of mercury in some of the cobalt ores of the Nipissing mine, and by the finding of scheelite, one of the ores of tungsten, at the Jupiter mine, Porcupine, by Mr. A. G. Burrows, a member of the geological staff of the Bureau of Mines.

Petroleum.

The petroleum industry has been for long a staple one in Lambton county. The wells there were opened over 45 years ago, and about six years ago Tilbury East and Romney townships proved to contain oil. But the yield in both fields is steadily declining, and in the newer field the rate of diminution has been greater than in the older one. Twenty years ago the production of crude in this province was 35,000,000 gallons, while in 1911 it was probably not in excess of 10,000,000 gallons. Much the greater part of the crude required by the refineries in Ontario is imported from the United States. The oil-bearing formations in southwestern Ontario have great thickness and are of wide extension, and it is quite possible that new pools will be discovered. The past history of the field warrants such expectations.

Natural Gas.

The counties on the north shore of Lake Erie constitute the natural gas fields of Ontario. In 1910 the product was valued at about $1,500,000, and in 1911 the yield was probably worth about $2,000,000. Welland, Haldimand, Norfolk, Elgin, and Kent all contribute to the supply, the most productive counties being Kent, Haldimand, and Norfolk. The gas is piped to Hamilton, Brantford, Galt, Chatham, Windsor, Walkerville, and other towns and villages, and about 250,000 people of the southwestern peninsula enjoy the advantages of an ideal fuel and a good light, at an average of about 25 cents per 1,000 cubic feet.

Salt.

The salt industry maintains from year to year a fairly uniform production of about 80,000 or 85,000 tons, worth $400,000, or $450,000. The chief point of production is Windsor, but there are many smaller plants along the eastern shores of Lakes St. Clair and Huron. There is unlimited scope for expansion in those branches of the chemical industry which use salt as raw material, for instance in the making of soda, soda-ash, bleaching powder, etc. The necessary limestone is abundant.

Gypsum.

The gypsum beds in the valley of the Grand River are being worked more extensively than in previous years, the demand for this article in the Portland cement manufacture having given a stimulus to production. The output in 1910 was 10,043 tons, but the figures for 1911 will show an increase.

Building Materials.

Building materials continue to be produced annually in such quantities as are required. One of the chief seats of brick-making, and also one of the largest markets for the finshed product, is Toronto, where building for the last few years has been extremely active. The brickyards in the suburbs of this city have not been able to supply bricks as fast as contractors required them.

The advantages of tile draining are now recognized by the farming community, and tiles are being made in increased quantities. The manufacture of lime has, like other industries, been concentrated of late years. The old fashioned lime-kiln which the farmer and his son operated at odd times, has been replaced by large plants scientifically constructed and operated. The manufacture of Portland cement has undergone a wonderful increase during the twenty years since it was established in Ontario. The output for 1910 was nearly 2,500,000 barrels, and for 1911 will no doubt be still greater. Stone quarries are feeling the competition of cement, and of late years their output has not been increasing.

There are other branches of the mineral industry in Ontario of considerable importance, but it is scarcely necessary to pursue all the details. It is perhaps sufficient to say in conclusion that year by year this industry is attaining a more important position in the Province, and that there is no reason to think its future history will be less striking than it has been up to the present time. The undeveloped mineral resources of Ontario are undoubtedly great. Other Cobalts, other Porcupines, other Sudburys, and possibly other petroleum and salt fields, may await in northern Ontario the coming of the prospector, on whose hope-inspired and unwearying labours the mineral industry has its rock-bottomed foundation.

THE COLLIERY MANAGER (NEW STYLE).

A Topical Song.

(Music from "Pinafore"—"A British tar is a soaring soul.")

Editor's Note.—Our Nova Scotian correspondent very thoughtfully forwarded us a copy of the following topical song, which was rendered at the yearly gathering of the officials of a large English colliery. "The new Mines Act," says our correspondent, "which "has just passed the House of Lords in England, is "a very grandmotherly piece of legislation, and, al- "though the complaint of the colliery manager is "humorously put, there is a good deal of truth in his "complaint."]

TENOR.

A manager is an anxious soul,
As free as a caged bird;
An apologetic moan must be ready to atone
For a dictatorial word.
His eyes may flash with a suppress'd fire,
His soul with wrath be wrung;
But he must not speak with a domineering frown
Or the sting of an angry tongue.

BASS.

The collier smiles as he smokes and spits;
He grins a bit while his brow he knits;
For pleasant little sums his thoughts engage,
While he chuckles as he reckons up his minimum wage.

CHORUS.

He slaps his thigh, though he makes his growl;
He rubs his hands, though he tries to scowl:
For he feels he's Boss—and he's, oh, so rude!
And this is now his customary attitude.

TENOR.

A manager is a captive soul
Chained fast to his pit in fact;
He cannot be away for a single blessed day
(According to the new Mines Act);
He must inspect every working place,
He must be everywhere;
He must see each man gets a reasonable wage
Though he neither try nor care.

BASS.

And then his owner grunts and groans,
(And he's not forbidden to indulge in frowns)
Every cost-sheet puts him in a greater rage
As he reckons up the working of the minimum wage.

CHORUS.

He slaps his thigh as he makes his growl;
He wrings his hands with a fearful scowl:
For he gets neither money nor gratitude;
And rage is now his customary attitude.

TENOR.

A manager is a weary soul
And often is sick at heart;
Though he may do his best he may one fine day
Be condemned if he fail in part.
He must know every science from A to Z
A jack-of-all-trades must he be;
He must ventilate the mine, in Mechanics he must shine
And eke in electricitee.

BASS.

The Inspector comes on his frequent round,
The men's representatives are always underground;
He's watched like a dog from dawn till dark,
But a dog which may neither bite nor bark.

CHORUS.

He scratches his head and he thinks a bit,
"It's the worst job on earth to manage a pit;
It's not well paid," and we must conclude
That he sometimes takes a discontented attitude.

TENOR.

A manager is a worthy soul,
With a lot of British pluck,
Though he's got a lot to do, he intends to see it through

BASS.

If he's only some decent luck.
He knows his calling's a noble one,
He stokes the Ship of State,
He makes the steam for the railway train,
And he fills the poor man's grate.

BASS.

(rall. & p.)

It's a perilous trade, and who knows so well
The dangers which one day may sound his knell;
But he keeps a brave heart for he knows that he
Keeps the lives of all those hundreds in the colliery.

CHORUS.

(a tempo)

But from time to time he unbends a little bit
He meets old friends and forgets about the pit;
He's no one to worry or to persecute
He's as happy as a sandboy at our Institute.

COBALT AND PORCUPINE SHARES DURING 1911.

(Written for the CANADIAN MINING JOURNAL by E. D. Warren & Co.)

Practically the only important feature in mining markets during the past year was the introduction of Porcupine stocks. These issues were first listed during the early spring, when Hollinger made its appearance. This stock was underwritten at $3.50 and rapidly advanced, with temporary setbacks, to more than four times its initial price.

Shortly after the successful introduction of Hollinger, Preston East Dome was underwritten at 30 cents, and a few days after it had been listed on the exchanges, sold up to 57 cents. This flotation was quickly followed by others, the most successful of which were Dome Extension and Rea. The Foley-O'Brien, Dobie, West Dome and others met with cool receptions, the public having absorbed all the Porcupine stocks it could in the absence of any production or extensive developments. However, those stocks which had been listed continued to hold fairly steady, and in some cases showed advances, until news of the great fire which swept over the district caused much shrinkage in values. Since then the market has been to a very large extent a professional one, with here and there a slight renewal of public interest.

The Cobalts have been exceedingly quiet, and with one or two exceptions, the stocks of that district have greatly declined in price during the year. Coniagas and McKinley-Darragh have been the most sought after by investors in Cobalt. While the production of the camp has been less than that of previous years, the dividends for 1911 were greater by $2,000,000 than the dividends for 1910. However, the speculative features which formerly made the issues of this district so attractive have been absent, and the purchases have been made by investors who are satisfied to receive a fair return on their money and entirely disregard the speculative factors which are of such importance to most investors in mining shares.

Since the fire, the companies operating in Porcupine have laid broad and deep foundations for the future and the time is almost at hand for production to commence. With the mills of half a dozen companies in commission, as they will be during the next six months, Porcupine is bound to take on more and more importance in the estimation of investors, and the bull market which is confidently predicted for the early part of the coming year will presumably develop into one of the strongest and most active markets seen in mining shares in a number of years.

INSTITUTION OF MINING AND METALLURGY

ANNUAL DINNER

About 230 sat down to the annual dinner of the Institution of Mining and Metallurgy, held at the Savoy Hotel, London, December 15th. The chair was taken by Mr. H. Livingstone(Sulman, who was supported by Sir Alfred Keogh (Rector of the Imperialy College of Science and Technology), Sir Robert Morant (secretary of the Board of Education), Dr. W. C. Unwin (President of the Institution of Civil Engineers), Mr. S. Z. de Ferranti (President of the Electrical Engineers), Dr. R. Missel (President of the Society of Chemical Industry), Sir Carl Meyer, Sir Gerard Muntz (President of the Institute of Metals), Dr. C. A. Keane (Principal of the Sir John Cass Institute), and various Past and Vice-Presidents of the Institution.

Sir Alfred Keogh, in proposing "The Institution of Mining and Metallurgy," said it was the custom among Britons wherever they might be to form themselves into societies and associations, and a similar course was taken by people who followed a particular line of work or branch of study. Their object was to maintain their own honour and—what was often forgotten—to maintain the public interest. In the professions of those present, as in his own, there was grave necessity that every individual should have a high standard of honour, and that, in addition to guarding their own interests, pay special attention to the interests of the public. He was not going to launch out upon his favourite subject of mining education, but he might mention that next month the Bessemer Memorial Committee would hand over to the Royal School of Mines the magnificent laboratory which they had presented to the Imperial College of Science and Technology. He was glad to think that the institution had been first to establish a close connection between scientific education and industrial work. Moreover, the institution had formed an Advisory Board to confer with the college authorities and prevent them from following too academic lines.

In responding, the Chairman remarked that they could not have had the case for the continuance of their institution more convincingly stated than it had been by Sir Alfred Keogh. He would not trouble them with many statistics, but might quote that the world's production of gold alone since 1880 had exceeded£1,-000,000,000, and over one-half of that huge amount had been won from mines within the British Dominions. The British capital involved in metalliferous mining, apart from coal and iron, during the same period approached, if it did not exceed, £900,000,000. From such figures it was obvious that the magnitude of the financial interests which determined their work could only be reckoned in millions. Moreover, the major proportion of those vast sums was controlled from London. The rapid growth of the institution evidenced the need felt for self-protection on the part of those engaged in the mining industry; in all there were now 2,200 members—actual or in course of training. The speaker concluded with some pungent references to self-conferred diplomas.

Dr. Unwin, responding to the toast of "Our Guests," said there had been a stone age, a bronze age, iron age, and now they had been born into the steel age. He supposed that the iron age had lasted from before the Roman time down to the middle of the last century. The great fabric of civilization rested upon the great metallurgical interests which they represented—(applause)—and as an instance of this he pointed out that Russia, with all its great area, used not more than a twelfth of the amount of steel which was used by either Great Britain or Germany.

THE WORLD'S PRODUCTION OF IRON

An interesting return was issued recently containing a memorandum and statistical tables showing the production of iron ore and pig-iron and the production of steel in the United Kingdom and the principal foreign countries in recent years and the imports and exports of certain classes of iron and steel manufactures, from which it appears that the combined output of iron ore in the ten principal countries dealt with exceeded 125 million tons in 1909, and if the output of the minor producing countries be added, it is probable that the world's total output in that year was about 130 million tons. The world's output in 1909 was thus about 2 1-2 per cent. below that of the year 1907, but the figures so far available indicate that the output in 1910 was well above that of 1907. The principal producers were the United States, Germany, the United Kingdom, France and Spain, in the order given, these five countries producing about six-sevenths of the total output of the world.

Complete particulars in regard to the production of iron ore in 1910 are not yet available. In the case of the United States, the output in 1908 was about 30 per cent. less than in 1907, but in 1909 there was an almost complete recovery and the output in 1910 was over 11 per cent. above that of the year before. In the case of Germany there was a partial recovery in 1909 from the sharp reduction of output shown in 1908, and the output in 1910 was well above that of any previous year. In the United Kingdom and in Spain the output in 1909 was even less than in 1908, but the British output in 1910 was only about 3 per cent. below that of 1907. In France the rapid increase shown in the production for several years before 1908 has been resumed. The marked reduction of the Swedish output in 1909 as compared with 1908, adds the report, was due to the great strike which occurred in Sweden in that year.

It is noted that relatively to population, Sweden has a production of iron ore considerably in excess of the other nine chief countries, amounting in 1910 to nearly one ton per head of the population; in the United States the production was about three-fifths of a ton per head; in Germany the yearly output was well over two-fifths of a ton per head, and in the United Kingdom about one-third per ton per head. It is remarked that in 1891 the quantity of ore mined in the United Kingdom, was slightly greater than in Germany, though less than in the United States. Since 1896, however, the output of Germany has outstripped that of the United Kingdom, and since 1902, with the exception of the years 1904 and 1908, the output of the United States has considerably exceeded that of the United Kingdom and Germany combined. The maximum output in this country was reached in 1882, when it amounted to over 18 million tons. It is now about 15 million tons.

With the regard to foreign trade in iron ore, the position of the countries included is very different. At the two extremes stand Spain and Belgium. The former exports nine-tenths of her output, the latter imports almost the whole of the iron ore she requires for the purposes of her iron and steel industries. Of the remaining countries, Sweden exports about four-fifths of her production, and in the case of Russia the exports have for the last eight years been considerably in excess of the imports. The United Kingdom, France, Germany

and the United States are all importing countries, though in different degrees. The first derives about one-third of the ore she utilizes from abroad, her exports being only trifling. The exports from France have increased considerably of late years, but about one-eighth of the ore smelted in 1909 was derived from abroad. The exports from Germany (which are sent chiefly to Belgium and France) are considerable, but are largely exceeded by the imports. The United States is nearly independent of foreign sources of supply.

With regard to the world's production of pig-iron last year, it is estimated at about 65 million tons, the principal countries of production being the United States, Germany and the United Kingdom, in the order named, these three countries together accounting for about four-fifths of the total output of the world. The United States accounted for 27,304,000 tons, Germany (including Luxemburg) 14,556,000 tons, the United Kingdom 10,012,000 tons and France 3,969,000 tons. The report goes on to remark that iron enters into foreign trade mainly in forms other than that of pig-iron. By far the greater part of the iron produced is converted into steel, and this conversion takes place mainly in the country where the pig-iron is produced. Taking the average of the last five years, in the United Kingdom about 56 per cent. of the pig-iron made was steel-making iron (haematite, basic pig, spiegeleisen, etc.), in France about 64 per cent., in the United States about 74 per cent., in Germany about 76 per cent., and in Belgium about 83 per cent.

The differences are partly due to the special suitability of Continental ores for making basic steel, but also to the relatively greater importance of the wrought iron and cast iron industries in the United Kingdom. Not only did the exports of forge and foundry pig iron amount in 1910 to about 8 per cent. of the total output of pig-iron of all kinds in the United Kingdom, but it may be estimated that about 26 per cent. of the iron made and retained in the country was used for foundry purposes, compared with 23 per cent. in the United States and with 19 per cent. in Germany. The exports of pig-iron from the United Kingdom are greater than the total exported from all other countries included in the tables contained in the report, and, on the average of the five years 1906 to 1910, amounted to 1,448,000 tons per annum, or 14.7 per cent. of the total British production.

The combined output of steel in the United Kingdom, Germany and the United States for 1910 exceeded 46 million tons, and the world's output may be estimated at between 59 and 60 million tons.

EFFICIENCY IN ORE ROASTING*

By ARTHUR S. DWIGHT.

This is a study of the relative efficiencies of some of the more important desulphurizing methods used in the metallurgy of lead and copper, to prepare the ore for smelting. It is proposed to show how these efficiency factors have served to shape the development of the roasting process from the crude and inefficient method of burning ore in heaps, through the multifarious forms of reverberatory furnaces, up to the recently devised systems of blast-roasting.

The exact purpose of the roasting operation is not always the same; thus in roasting lead ores, it is usually desired to eliminate as much of the sulphur as possible, in order to avoid making, in the smelting operation, an undue quantity of matte, a troublesome by-product which locks up valuable metals that ought to have been set free in the metallic product, and thus calls for an extra treatment to recover these metals. With copper ores, on the contrary, a matte is the logical product of the first smelting, and hence it is customary to leave a definite remnant of the sulphur to "cover" the copper and prevent unnecessary losses of metal in the slag. Again, on account of the greater fusibility of lead ores, and the ease with which lead may be volatilized and lost, a more careful heat regulation is necessary in their treatment, and this tends not only to lower the efficiency factor of a given type of furnace, but definitely to debar certain types from service with lead ores. However, these variations are no greater than those which may be caused by the varying skill shown in design and operation, and we may, therefore, neglect them for the purposes of the present discussion. It is sufficient to say that the relative efficiency factors here deduced will be approximately true for either lead or copper ores, though special metallurgical requirements may dominate the choice of apparatus.

The roasting capacities of different types of furnaces depend upon the same general principles, viz.: (1) the quantity of ore that can, within a given period of time, be effectively exposed to the oxidizing influence of the air, and (2) the rapidity with which the oxidizing action can be effected. Large area of hearth and frequency of stirring are the means generally employed for increasing the quantity of ore thus exposed, while careful control of the heat and air supply, fine crushing, and intelligent regulation of the chemical composition of the ore mixture contribute to the speed of oxidation.

Dr. E. D. Peters thus summarizes the fundamental requisites for rapid and efficient roasting: "(a) small ore particles. (b) A vigorous air current, which shall also sweep away the residual nitrogen of the spent air and the sulphur-dioxide gas which would dilute the atmosphere in contact with the ore so that its oxidizing power would lose its efficiency. (c) Frequent stirring of the ore, for, after the removal (approximately) of the first atom of sulphur from the pyrite—which atom is driven off by heat alone—the oxidation of the ore proceeds with discouraging slowness as soon as the upper layer of sulphide particles has become partially oxidized."

To determine the relative efficiency of different types of furnaces requires us to go a step further than the mere capacity of the furnace, as the question of fuel, labour, repairs, interest charges on the plant and on the value of metals locked up in the process, and finally the character of the product, have an important bearing. Many of these factors are variables, even when considering the same type of furnace under different conditions; hence it is difficult to select one factor which will tell the whole story. Taking everything into consideration, the best factor we have is the number of pounds of ore treated per day on a square foot of the furnace

*From the November School of Mines Quarterly, Columbia University.

hearth. This factor involves the time-element, which must necessarily enter largely into the make-up of most of the other factors, and it also involves the factor of size which gives a certain measure of the size of the furnaces and the buildings required for handling a given tonnage, and this, in turn, is a rough index of the first cost of the plant. As regards the important question of fuel, a "free-burning" ore will, when charged into the hot furnace, take fire and burn without any external fuel being required; and, although certain styles of furnaces are more suitable for propagating and maintaining this reaction than others, the actual efficiency factor will not be materially different whether all of the necessary heat is supplied by the sulphur in the ore itself or by coal burned on the grate, though the cost of roasting will probably be much higher when the external fuel is used. Again, the character of the roasted product, its fineness or coarseness, is a matter of great importance. If the blast furnace is to do its best work, it must be given material reasonably coarse and preferably cold. The reverberatory smelting furnace, on the contrary, does best when the charge is made up of hot fires. The smelter of copper has the choice of both types of smelting furnaces, but the smelter of lead is limited to the blast furnace, and hence is likely to be much more solicitous that his roasting operations shall yield him a coarse product. Briquetting the fine roasted ore has helped him to secure this desideratum, but this, in turn, has involved a separate and expensive operation, which results not entirely satisfactorily, so that briquetting is adopted only with reluctance. Other things being equal, that furnace which will turn out a products in coarse form is entitled to a long credit mark, and this may surpass in practical importance its efficiency factor.

We may divide those roasting methods which are tinent to this discussion into four principal classes:

I. Roast heaps and stalls.

II. Reverberatory roasters:

(1) Hand-stirred furnaces. (Hand-reverberatory.)

(2) Mechanically-stirred furnaces of diverse styles.

(3) Revolving cylinders. (Brückner, etc.)

III. Blast-roasting in pots by the Huntington-Heberlein, Savelsberg, Carmichael-Bradford and McMurty-Rogers methods.

IV. Blast-roasting of thin layers (Dwight-Lloyd System).

(1) Intermittent down-draft pans.

(2) Continuous-sintering machines.

It is not intended to describe in detail the different methods and furnaces here referred to, but merely to indicate those points which relate to this discussion, as well as those which are necessary to show the basis for calculating the efficiency factor.

I.—The Roast Heap.

This is the most primitive form of roasting appliance, requiring practically no plant but the area of ground upon which the coarsely broken ore is piled on a layer of cordwood to kindle it, and covered with a layer of finer ore to control the degree and direction of the draft. Some of the irregularities of heap-roasting may be prevented by conducting the operation in masonry stalls with paved floors containing air ducts, and sometimes a system of flues connected with a chimney to assist the draft and dispose of the noxious sulphur gases, but the principles involved and the efficiency factors are about the same. The bulk of the ore in the pile must be coarse, to permit the free passage of the gases. From the very nature of the operation, no rabbling or stirring is possible during the roasting, for which reason the results is discharged, streaks of imperfectly roasted material will be found which must be sorted out and subjected to a second fire and sometimes a third. This sorting and re-treatment may be considered as an archaic form of stirring or rabbling. Sometimes the same result is obtained more efficiently by successively stripping off the outside of the heap where the ore naturally roasts more quickly and effectively than in the interior. By thus scraping off the outer layers as fast as they are finished, the inner portions are successively given this same advantage until the entire pile is consumed.

Cheap and plentiful labour, though not necessarily skilled, is an essential when so much handling and re-handling is called for, but granted this, the cost of roasting a ton of ore in heaps may be as low as by the most modern and approved methods in spite of its low efficiency factor. The physical character of the product is generally favourable for the blast furnace, being coarse and spongy. Heap-roasting is frequently found to be an effective aid in getting a new metallurgical enterprise started quickly, on account of the absence of complicated plant, but is seldom used as a permanent method, at least under competitive conditions, because labour is usually not sufficiently cheap and plentiful. Losses by wind and by the leaching of soluble metallic salts by rain may be serious, particularly with copper ores. The great objection to heap-roasting, however, is that it is so slow that the interest charge on the capital locked up in the ore undergoing treatment becomes a serious item of expense. In other words, its efficiency factor is low. For this discussion, we may take the efficiency factor at 5 to 20 pounds per square foot of are at best extremely irregular. When a finished heap hearth area.

To illustrate this most primitive method, we may select the practice of heap roasting at Goslar, Lower Harz, Germany. The heaps are 35 to 40 feet square at bottom and 12 feet square at top, with a thickness of about 6 feet, resting on a layer of cordwood and faggots 16 to 20 inches thick, the whole being heavily blanketed with a thick layer of fines. The contents is about 400 tons. First roasting lasts 6 to 7 months, after which the unroasted portion is sorted out and directed to a second and even third fire of shorter duration. The "hearth area" is regarded as equivalent to the area of the average horizontal section of the pile, here taken at 872 square feet. Conceding that with favourable conditions and skillful manipulation the entire contents of the pile might be satisfactorily roasted in the first period of six months duration, the efficiency factor will be:

$$E = \frac{800{,}000 \text{ lb.}}{872 \text{ sq. ft.} \times 180 \text{ days}} = 5.1 \text{ lb. per day sq. ft of hearth}$$

There are examples of more efficient heap-roasting than this, for the Goslar practice prolongs the roasting period to what seems an unnecessary degree. The explanation is probably found in the fact that the recovery of part of the sublimed sulphur was attempted. This result would be promoted by heavy blanketing of the exterior by means of the layer of fines and this would naturally make the roasting slow.

In commencing our series of efficiency factors with the heap roast at 5 lb. per sq. ft. per day, we do with the further explanation that in other localities heap-roasting has been brought up to a relatively high degree of perfection, so that the efficiency factor may easily run as high as 20 pounds per square foot per day, and cases are on record where it has approached very close to the efficiency factor of the hand roasters, next to be described.

II.—REVERBERATORY ROASTERS.

The prototype of all the furnaces of this class is the German long hearth reverberatory furnace, the so-called *Fortschaufelungsofen*. This has a long rectangular hearth covered by a low, flat, reverberatory arch, with a fire-box at one end and an exit-flue at the other, and numerous working doors on both sides to admit the long handled tools for stirring or rabbling. The ore is fed to the furnace near the exit-flue, spread out in a thin layer on the hearth, frequently stirred to expose new surfaces for oxidation, and gradually moved by the rakes and paddles toward the fire bridge when it is exposed to the highest desirable heat just before being discharged. The labour of rabbling is severe in the extreme, and it was natural that efforts should have been made to relieve the workmen and accomplish the stirring by mechanical means. This gave rise to a great variety of mechanical roasting furnaces, of all shapes and sizes, and employing widely different mechanical devices for moving and stirring the ore, but the principle underlying all of the furnaces of this general type, both hand- and mechanically-operated, is the same.

From this point of view it will be interesting to observe how the efficiency factors of these highly developed forms of automatic roasting furnaces compare with one another, and with their own prototype, the hand roaster.

Hand-Stirred Reverberatory.—The general features of this furnace have been already described. The earlier furnaces were smaller than those of later construction, but a length of 65 feet and a width of 15 feet were found to be the practical limits of hearth area, and very few improvements have been made in this furnace during the past 20 years. By reason of the greater flexibility of hand-rabbling, this furnace has been found peculiarly suited to roasting lead ores, and in spite of all the efforts that have been made, in the interest of economy of labour, to adapt the many automatic furnaces to this service, the hand roaster has remained, almost to this day, the one trusted and reliable roaster for the lead metallurgist, that is able to meet any situation that may arise. It is costly to operate, both as to fuel and labour, and occupies an enormous area in proportion to its output (i.e., its roasting efficiency is low) but it is reliable. Another reason for its long popularity is the favourable character of its product. By care in making up the charges, and skill in regulating the heat at the finish, the particles of roasted material can be discharged in a sort of nodulized condition which is considered reasonably favourable for the blast furnaces.

One modification of this furnace which was extensively used in the West for some years was the slagging roaster, which was originally used at the Omaha & Grant Smelter, Denver, Colo. This consisted of a combination of a reverberatory melting hearth next to the fire bridge, and a long flat hearth in which the preliminary roasting was effected by the waste gases from the fusing-box. The ore, during roasting, was gradually moved toward the fusing-box, and finally scraped in and melted in batches, forming a slag which was drawn into pots, and, when cold, was sent to the blast furnace. This product was highly appreciated for its coarse mechanical condition, but the practice was finally abandoned on account of high metal losses. It was an interesting development, however, as an illustration of the price the lead metallurgist was willing to pay for a coarse smelting material.

The capacity of a typical hand roaster with a hearth 60x15=900 square feet was about 12 tons per 24 hours or 26.6 pounds per square foot per day. Collins gives the following comparative factors of efficiency, in pounds per square foot per day: Przibram, Bohemia, 31; Laurium, Greece, 28; Port Adelaide, Australia, 12; Cockle Creek, Australia, 29; Colorado Smelting Company, Pueblo, Colo. (Eilers plant), 37; St Joseph Lead Co., Bonne Terre, Mo., 30; No. 3 Monterey, Mexico, 24; Murray plant, Utah, 24. We may, therefore, take the efficiency factors for hand roasters as between 24 and 35 pounds per square foot per day.

Mechanically Stirred Reverberatories.—The development of the automatic roaster from the hand-reverberatory has been already referred to. The line of improvement follows almost exclusively the one idea of more frequent stirring of the ore. Again to quote Dr. Peters. "What I wish to point out in this immediate connection is that this question of a more frequent stirring of the ore was the one glaring fault in our roasting practice of 30 years ago, and, that, really, almost the entire energy and ingenuity of the inventors and users of automatic furnaces were focussed upon this single point. All the wealth of science and of modern mechanical skill has been brought to bear upon the exposing of fresh particles of ore to heat and oxygen as frequently as is needful, and has been successful."

Mechanically stirred furnaces had been used many years ago in England, principally for roasting tin ores, but apparently at that time they did not fit into the requirements of the copper and lead business, or, if so, it was to a very limited extent. The Parkes, original MacDougall, and Brunton furnaces were invented at that time, and have served as the prototypes of some of the most successful of the modern automatic furnaces. The O'Harra was developed in the early days of Butte, Mont., and became the prototype of another series of adaptations. In fact, there was a voluminous crop of patent furnaces, and almost every metallurgist of renown had one of his own. The rivalry was intense, and furnished an interesting and probably a necessary chapter in the history of American metallurgical practice. Some of these furnaces had commendable features, but the chief praise that could be given to most of them was that they were "different." Of the many that once bewildered the metallurgist, a few that had the requisite combination of merits have survived. These merits are simplicity, durability and low repairs, low first cost and satisfactory efficiency. A glance at the table of relative efficiencies of these automatic furnaces will show that there was an exceedingly small range of variation among the different styles, considering the extent of the effort that was made for improvement. The following table gives representative figures of efficiencies (pounds per square foot per day) for furnaces of different styles operating under widely different conditions, in both lead and copper work.

EFFIECIENCY OF FACTORS OF VARIOUS STYLES OF MECHANICALROASTERS.

	Collins.	Kern.
Brown-Allen-O'Hara	34	74
O'Harra, Butte, Mont.	—	33- 36
Brown horse-shoe	48	35- 38
Brown horse-shoe (treaing matte)	38	
Pearce turret (treating matte)	43- 55	60- 66
Ropp straight-line, Port Pirie, Australia	95	
Ropp straight-line, Hanauer, Utah	33	
Ropp straight-line, general conditions	60	67- 77
Keller-Cole-Gaylord, Germania, Utah	104	44- 48
Heberlein, light roast	150	
Heberlein, Sullivan, B.C.	169 (?)	
Godfrey, Murray, Utah	54- 80	
Godfrey, Australia	141	
Wethey, original		60- 65

Wethey, improved	65- 70
McDougall, Evans-Kleptko, Anaconda, Mont.	84 86
Edwards	140-152
Herreshoff-McDougall	30- 35

It is evident, therefore, that we may safely claim for furnaces of this class an efficiency varying from 33 to 75 pounds per square foot per day for ordinary conditions, and as high as 150 pounds per square foot per day when but little sulphur elimination is required. This latter figure may properly be used in making comparisons with the blast-roasting processes.

Revolving Cylinder Roasters.—As exemplified by the Brückner cylinders, this type of roaster was very popular at one time both in lead and copper work, but is now almost entirely abandoned. The high proportion of flue-dust made by the Brückners was one of the principal causes of the gradual abandonment of this method of roasting. It is to be regarded essentially as a revolving reverberatory furnace in which the inner lining of the cylinder becomes successively the hearth and the reverberatory arch of the furnace, and the exposure of fresh surfaces of ore is accomplished by the changing talus of the material as the cylinder slowly revolves. The area of the hearth may be taken for practical purposes as equivalent to the horizontal projection of the cylinder.

At the Germania plant, in Utah, the Brückner practice attained its highest perfection. Here the cylinders were 22 feet long by 8½ feet diameter, and treated 12 tons per day. Equivalent area of hearth was 187 square feet, making the efficiency factor 128 pounds per square foot per day.

To summarize the characteristics of the automatic roasters of the reverberatory type, we may say that they show a distinct gain in efficiency over the hand-stirred type, though the gain is not so marked as one would expect. The truth is that a practical limit is soon reached as to the amount of sulphur that can be burned on a square foot of hearth area in a given time without causing the sulphides to melt and interfere with the further progress of the reaction, or clog the stirring mechanism. This practical limit probably corresponds closely to the efficiency factor of 75 pounds per square foot per day, though in certain special cases where the ore contains less sulphur, or from its nature will bear a higher temperature without fusing, or where there are special provisions for moderating the resulting temperatures, (as in some of the improved types of MacDougall furnace, notably the Wedge furnace), the efficiency factors may be carried as high as 175 pounds per square foot per day.

III.—Blast Roasting in Pots.

The last paragraph called attention to the great stumbling-block in the way of increasing the efficiency of the mechanically stirred reverberatory, arising from the too rapid generation of heat by the mass-action, whereby the sulphide is caused to melt or "matte." The next important advance in the art of roasting resulted from the discovering how to control and check this mass-action. It was accomplished by mixing the grains of sulphide to be roasted with grains of an inert or refractory material in such proportion that the particles of sulphide are held apart from one another by refractory grains. If a mass of material so constituted be ignited at one surface and a blast of air forced through it, the sulphide particles will successively shrivel up in the fierce oxidizing blast, and the reaction will propagate itself through the mass in the direction of the air current. An additional advantage may be secured if the isolating grains are of such composition that, while they remain inert during the roasting period, they will, at the temperature developed by the cumulative mass-action, combine with the newly formed metallic oxides to form a reasonably fusible slag or sinter. This is the action as we now understand it, but at first the reason for the extraordinary rapidity of the roasting was not so evident. Instead of recognizing it as a purely mechanical effect, Messrs. Huntington and Heberlein, who first developed this process, were misled into the belief that some powerful chemical reagent was at work, and that the burnt lime they employed as an isolating ingredient of the charge was the vehicle for nascent oxygen in the form of CaO_2. So sure were they of this fact that they based their patents in all the important countries of the world upon this reaction, and the theory was generally accepted as true until research demonstrated that it was untenable. Even then it was generally held that the lime had some important though mysterious chemical effect, and the process was still called "Lime Roasting." It has now been demonstrated that many other substances will answer as well, if not better than lime, and "Blast Roasting" is now generally accepted as the more logical and precise designation.

Although Messrs. Huntington and Heberlein did not realize at first the true cause of their success, they are none the less entitled to great credit for working out a successful process which constituted a great step in advance, and removed some of the most perplexing difficulties of the lead metallurgist. They made it possible to roast fusible galena ores cheaply, efficiently and with diminished metal losses, yielding a product of remarkably favourable physical character, which greatly promoted the efficiency of the subsequent smelting. Although the form of apparatus they employed (blast-pots) was crude and primitive, the efficiency factor was far higher than had ever been previously attained by what Dr. Peters has referred to as the "wealth of science and modern mechanical skill," as applied to the roasting problem.

The procedure originally proposed by Huntington and Heberlein required a pre-roasting of the charge before treatment in the pots, but as experience was gained in manipulation it was found possible, under some conditions, to dispense with the pre-roast and subject the charge to direct converting. The variations in the process devised by Carmichael and Bradford in Australia, and by Savelsberg in Germany, dispensed with pre-roasting. The first named investigators noticed that sulphate of lime was quickly formed in the converter, and reasoned that it might as well be introduced at the start in place of the burnt lime. Savelsberg carried this reasoning still further, and substituted crushed limestone. Patents were granted to all of these investigators, and their processes have found extensive utilization. But the efficacy of the lime was unquestionably overestimated, and its true function misunderstood.

The original Huntington-Heberlein pot was small and deep. As the roasting and sintering action propagates itself progressively upwards, the time needed to complete a charge depends more upon the distance which this silowly moving zone has to travel than upon the actual weight of material treated. The present writer has shown in a previous article that, on account of this progressive sintering, most of the space in a converter is utilized for storing rather than for treating its con-

tents. It was to be expected, therefore, that the improved forms of pots developed by later experience should be larger and shallower. As the depth was diminished, however, the proportion of unsintered fines tended to increase, and this tendency limited the improvement in that direction. The reason for this is found in the fact that the gases escaping at the top of the pot keep the loose particles on the top surface in constant agitation and thus prevent the close brooding contact which is necessary to secure complete sintering. With a modern 10-ton pot, 9 feet diameter by 4 feet deep, the proportion of fines will usually amount to about 10 per cent., sometimes as high as 25 per cent.

The pot discharges its product in the form of a huge cake of sintered material, which requires considerable hand labour to break into suitable size for smelting, even after a preliminary shattering of the sake has been accomplished by dropping it from a height. On account of its coarseness and its more or less cellular structure, the pot product is highly prized as material for the blast furnace.

The initial sulphur in a properly proportioned blast-roasting charge should not be higher than about 18 per cent. if the most efficient results are to be obtained, and this fact should be kept in mind in comparing the efficiency factors with those of the older types of roasters. As already stated, the most favourable efficiency factor of the automatic reverberatory roasters (175 pounds per square foot per day) may properly be used in making comparisons with blast roasting results. The grate in the bottom of the pot, through which the air enters the charge, is much smaller than the diameter of the pot, and as there is a very complete diffusion of the air through the charge it seems only proper in calculating the equivalent hearth area of a pot, to use the area of the average horizontal section, just as was done in the case of the roast heaps, previously discussed.

The published figures of costs and capacities of the early Huntington-Heberlein work show some serious discrepancies, and are usually much more favourable than the same process and presumably improved practice. The following cases have been selected as fairly showing the range of capacities:

Huntington-Heberlein.—Converters hemispherical 9 ft. diameter by 4 ft. deep, holding 8 tons material. Grate 6 ft. diameter, but assume equivalent hearth area (7½ ft. diameter) 44 sq. ft. Time of blowing 12 to 18 hours. Allow 1½ turns per day. Hence, capacity is 12 tons per day per converter, and efficiency factor is 545 lb. per sq. ft. hearth area per day.

Huntington-Heberlein, Trail, B.C.—Converters, 8 ft. 8 in. diameter by 4 ft. deep, hold 12 tons. Equivalent hearth area 44 sq. ft. Capacity 15 tons per day per converter. Efficiency factor 680 lb. per sq. ft. per day.

Savelsberg.—Pots, 8 ft. diameter, contain 8 tons; equivalent hearth area, 38.5 sq. ft. Time of blowing 18 to 20 hours, say 1¼ turns per day, or 10 tons per day per converter. Efficiency factor is 520 lb. per sq. ft. per day.

McMurty-Rogers.—Pots, 8 ft. 8 in. diameter by 4½ ft. deep; take 8-ton charge. Equivalent hearth area, 44 sq. ft. Time of blowing 12 hours. Assume 1¾ turns per day; capacity is 14 tons per day per converter. Efficiency factor is 636 lb. per sq. ft. hearth per day.

Roasting-boxes, Bingham Junction, Utah.—Hearth area, 36 sq. ft. Capacity 16 tons per day. Efficiency factor 890 lb. per sq. ft. per day. (Considerable percentage of fines requiring re-treatment).

From the above figures we draw the conclusion that the average efficiency factors for pot-roasting lie between 500 and 900 pounds per square foot per day, with average probably close to 600 pounds. This is indeed a remarkable gain in efficiency over the best work of the reverberatory furnace under equivalent conditions of sulphur elimination, and fully justifies the verdict pronounced by Prof. Joseph W. Richards in 1908 that pot roasting was "the most radical improvement in recent years in the metallurgy of lead."

IV.—Blast Roasting of Thin Layers.

Attention has here been called to two of the weak points of the pot-roasting procedure caused by the use of the thick layer, viz.: The ineffective utilization of the space in the converter, and the massiveness of the cake produced. Very early in his efforts to devise a means for adapting the blast-roasting idea to the treatment of copper fines, the present writer came to realize the economic importance of finding a means for *completely sintering a thin layer,* in order to eliminate these two objectionable features. When a thin layer, say 4 in. thick, was treated on an ordinary grate with up-draft, the bottom 2 inches would be sintered and the upper 2 inches would remain pulverulent. This was the net result of the efforts of many who experimented in this line. Finally it was found that by applying a mechanical means for holding quiescent the particles which had usually remained unsintered and maintaining them in close contact with one another, a complete agglomeration could be effected. It was found that this could be accomplished by restraining screens with up-draft, but the simplest way was to constitute the supporting grate the restraining screen by reversing the usual direction of the air-blast and passing the air downwards. This completely solved the problem. It had the beneficial effect also of automatically preventing channelling and the formation of blow-holes. The resulting gain in efficiency was remarkable. When the principle was applied to shallow down-draft pans operating intermittently, the results were much superior to the best work of the pots, the product was more porous and easily broken to the desired size, and, on account of the lesser mass-action and greater heat radiation of the thinner layer, a wider range of chemical composition was permissible. Further study along these lines pointed out the way to making it a *continuous* process, and this has still further increased the efficiency factor, so that the final result achieved shows almost as great an improvement over the pots as these had previously shown over the best automatic reverberatories.

Intermittent, Dwight-Lloyd Down-Drift Pans.—The intermittent procedure has been tried generally in an experimental way or as a preliminary to the adoption of the continuous process, by which the former has almost invariably been superseded. Accounts have been published of two sintering plants that were designed to treat thin layers intermittently, following the procedure described in the fundamental patent of Dwight and Lloyd.

One of these plants was that built at Cerro de Pasco, Peru, in 1907, under an arrangement with the owners of the Dwight-Lloyd patents, but following independent designs. The description is incomplete and the figures not entirely consistent, which is probably explained by their being taken from a Peruvian government report. The installation appears to have been not very satisfactory, and did not operate long. The reasons are sufficiently clear.

The other plant was built at Port Pirie, Australia, by the Broken Hill Proprietary Company, to be used in

connection with the Carmichael-Bradford gypsum process. It has since been superseded by the Dwight-Lloyd continuous process without gypsum. Its efficiency factor was about 1,800 pounds per square foot per day.

The principal reason why the efficiency factor of the intermittent apparatus is lower than that of the continuous is because of the time lost in the former by the operations of charging, igniting and discharging, and the difficulty of knowing just how the process is progressing and when it is finished. This loss of efficiency has been found to be 30 to 50 per cent. Under reasonably favourable conditions the writer has found the efficiency factor of the down-draft intermittent method to be 1,000 to 2,000 pounds per square foot of hearth per day.

Continuous Process.—No attempt will here be made to describe the details of this method. It is sufficient to say that in the method now generally used a thin layer of the ore is fed on a continuously moving conveyor, with grated bottom, travelling over an air-tight box connected with an exhaust fan, which causes air currents to be drawn down through the layer of ore and the grate upon which it rests. Immediately after the stream of ore emerges from the feed hopper its level top surface is ignited by momentarily passing under an igniting device. Thenceforward the heat necessary for the propagation of the roasting and sintering reaction is derived from the internal combusion of the sulphur or other combustible ingredient of the charge. The speed of travel is so regulated that when a given portion of ore has travelled across the suction box to the point of discharge, the zone of sintering action has progressed down to the grates, and the operation is complete. The fact that all the adjustments are reduced to mechanical terms makes it possible to keep the closest watch on each condition independently and quickly to correct any departure from normal.

RESUME OF EFFICIENCY FACTORS.

I. Roast heaps and stalls	5 to 20 lb.	Good
II. Reverberatory Roasters:		
(1) Hand roaster	24 to 35	Fair
(2) Mechanically stirred:		
average conditions	33 to 75	Too fine
special conditions ...	150	Too fine
(3) Revolving cylinders ..	128	Too fine
III. Blast roasting pots	500 to 900	Excellent
average	600	Excellent
IV. Blast roasting of thin layers (Dwight-Lloyd system:		
(1) Intermittent down-draft pans	1000 to2000	Excellent
(2) Continuous sintering machines	2000 to 3000	Ideal

The hearth area for purposes of calculation is the horizontal area of the layer undergoing treatment, which is the same as the top area of the suction box. Assuming average figures for specific gravity of ores and for sulphur contents, a standard Dwight-Lloyd sintering unit (type E, 42 X 264 in.), with an effective grate area of 77 square feet, will easily treat 85 tons per day of average suitable material without a preroast, which is equivalent to an efficiency factor of 2,200 pounds per square foot hearth area per day; while with a charge corresponding to those with which the best results are obtained in the pots; the capacity runs as high as 120 tons per day, equivalent to an efficiency factor of 3,000 pounds per square foot per day.

MINES BRANCH

List of Publications issued during 1911.

69. Chrysotile—Asbestos: Its Occurrence, Exploitation, Milling, and Uses (Second Edition)—by Fritz Cirkel, M.E.—pp. 316; illustrations 154; maps 2.

82. Bulletin No. 5: Magnetic Concentration Experiments with Iron Ores of the Bristol Mines, Que.; Iron Ores of the Bathurst Mines, N.B.; A Copper Nickel Ore, from Nairn, Ont.—by G. C. Mackenzie, B. Sc.—pp. 28; illustrations 4.

84. Gypsum Deposits of the Maritime Provinces—by W. F. Jennison—pp. 171; illustrations 55; maps 3.

88. Annual Report of the Division of Mineral Resources and Statistics on the Mineral Production of Canada, during the calendar year 1909—by John McLeish, B.A.—pp. 291.

89. Proceedings of Conference on Proposed Legislation on the Manufacture, Importation, and Testing of Explosives; Held House of Commons, Sept. 23, and Sept. 30, 1910—by Dr. Eugene Haanel—pp. 41.

92. Investigation of the Explosives Industry in the Dominion of Canada, 1910—by Capt. Arthur Desborough—pp. 16.

93. Molybdenum Ores of Canada—by Dr. T. L. Walker—pp. 64; illustrations 24.

102. Preliminary Report on the Mineral Production of Canada for the Calendar year 1910—by J. McLeish, B.A.—pp. 21.

103. Mines Branch Summary Report, 1910——pp. 237; illustrations 17; map 1.

114. Production of Cement, Lime, Clay Products, Stone and other Structural Materials in Canada, 1910—by J. McLeish, B.A.—pp. 60.

115. Production of Iron and Steel in Canada during the Calendar Year 1910—by J. McLeish, B.A.—pp. 38.

116. Production of Coal and Coke in Canada during the Calendar Year, 1910—by J. McLeish, B.A.—pp. 31.

117. General Summary of the Mineral Production in Canada during the Calendar Year 1910,—by J. McLeish, B.A.—pp. 37.

Reports now in the Press

83. The Coals of Canada: An Economic Investigation—conducted at McGill University, under the Auspices of the Dominion Government—by Professors J. B. Porter and R. J. Durley,—and others. In six volumes:—

Vol. I.—Coals: Sampling, crushing, washing, mechanical purification, and coking trials.

Vol. II.—Coals: Steam boiler, producer, and gas engine trials, also Chemical Laboratory work.

Vol. III.—Coal Washing Tests: Tables and Diagrams.

Vol. IV.—Boiler Tests: Tables and Diagrams.

Vol. V.—Producer and Gas Engine Tests: Tables and Diagrams.

Vol VI.—Chemical Tests: Tables and Diagrams.

100. Report on the Building and Ornamental Stones of Canada—by Professor W. A. Parks.

104. Catalogue of Publications of Mines Branch, from 1902 to 1911: containing Tables of Contents, and List of Maps, etc.

110. (Bulletin No. 7) Western Portion of Torbrook iron ore deposits, Annapolis County, Nova Scotia—by Howells Frechette.

111. Diamond drilling at Point Mamainse, Ont., by A. C. Lane, Ph.D., with Introductory by A. W. G. Wilson, Ph. D.

118. Mica: Its occurrences, exploitation, and uses—by Hugh S. de Schmid.

143. Annual Report on the Mineral Production of Canada during the Calendar year 1910—by J. McLeish.

SPECIAL CORRESPONDENCE

ONTARIO.

Cobalt, South Lorrain, Gowganda and Elk Lake.

With one or two exceptions the Cobalt camp now possesses no properties on a purely speculative basis; the money that has been diverted to the gold mines and the gold prospects of the province left the companies operating with the public's money with no alternative but to shut down. The Canadian speculator too has learned much wisdom by experience and will not now bite at every hook that is dangled before his eyes. And so it comes to pass that while the dividends taken out of the camp and distributed to shareholders from one end of Canada to another and all through the Eastern States are in aggregate larger than last year, the amount of money put into the ground and into the pockets of promoters is less. On a profit and loss account the year 1911 was much the most profitable that the premier camp of Ontario has as yet seen.

It is one of the most creditable features of the camp that each successive rise in the production has meant a commensurate increase in the aggregate dividends paid; the public has benefited by every advance either in the amount produced or the skill in mining that keeps down the costs in spite of a lower grade of ore.

	Production.	Dividends.
1909	$12,356,422	$6,308,316
1910	15,000,000	7,902,000
1911	16,000,000	8,395,585

It will be seen from the above table that whatever gain has been made in production the Cobalt shareholder has had his fair proportion of the advantage.

Last year saw the first scientific attempt to solve the problem of reducing the low grade ore of the camp to dollars and cents. All the big dividend paying mines of the camp have been content to make their profits out of nothing less than 30-ounce ore and allow the lower grade to remain on the dumps or in the stopes. This year the experiments at the Nipissing and the Nova Scotia, in every way successful, to amalgamate first and afterwards cyanide the tailings has rendered the treatment of 15-ounce ore remunerative. Next year will see another step forward in the process of scientifically picking up the scraps that are falling from the rich man's table, when the 200-ton mill of the Nipissing is in operation. It by no means denotes that the dividend paying mines are now running out of high grade and have to fall back upon the crumbs but it does show that the banqueters see that unless they mix their rich wines with water and tone down the rich viands with more modest fare there is an end of the feast within measurable distance.

Taking property by property there has been very little change in the past year. To the north of the west ridge the Temiskaming and Hudson Bay was able to submit a very business like report last October. It went to show that during the first year the new mill had been in operation a gross value of $424,488 had been produced at a cost of 14.7 cents an ounce, leaving a net profit to the shareholders of $288,972. As several new veins have been discovered during the year it is most probable that this production will be maintained next year. A 300 per cent. Temiskaming and Hudson Bay dividend only calls for $23,283, so that it is easily seen that the property is likely to raise the record of the payments several thousands per cent. yet.

It is to the Coniagas, perhaps, more than any other mine in the camp that 1911 was so far the apex year for the Cobalt camp both in dividends and production. After a long period of probation the Coniagas suddenly emerged last year as a 9 per cent. per quarter dividend payer with ore reserves in sight for years ahead. It seemed that every drift commenced, widened, and every crosscut started was sure to find ore. Though the Coniagas is to-day milling on an average 186 tons per day it is yet so rich in streaks that more than half the produuction still comes from the mine ore that is hand-picked in the mine and goes direct to the Thorold smelter. The progress of the Coniagas when set forth in production and ore reserves is very remarkable. Last year while nearly 4,000,000 ounces were mined it is very probable that as much was put in sight. Here are the figures:

	Production.	Ore Reserves.
1908-1909	1,407,228	12,557,700
1909-1910	1,929,531	15,368,400
1910-1911	3,789,273	15,750,000

It is true that when Mr. R. P. Rogers made his estimate it looked too good to be true, and he reduced it by 20 per cent. to be on the safe side, but the first estimate in view of the new ore bodies that have been found in new territory is the more likely to be correct. If the 20 per cent. were allowed off it would mean that practically all the ore taken out of the mine had not been offset by any ore put into sight last year at all, which, in view of the prolific character of the Coniagas ground would be most improbable. And not only is the Chairman of the Transcontinental Commission's mine producing at an extraordinary rate, but it is turning out the silver at a profit only equalled by the Crown Reserve and the Kerr Lake, when they were mining their half bullion veins. The 3,789,273 ounces produced last year from 25 acres of the West Ridge cost the company only 8.8 cents per ounce. As the price of silver advanced from one to two cents last year it is easy to see that the Coniagas will have no difficulty in maintaining its $1,440,000 dividend requirements for several years to come. It will next year join that select and delectable brotherhood of Cobalt mines that have more than redeemed their capitalization. To-day that list reads:

	Per Cent.	
Buffalo	137	$1,337,000
Crown Reserve	215	3,626,061
Kerr Lake	124	3,720,000
Nipissing	129	7,740,000
T. & H. B.	190,000	1,474,590

Next year should see the Coniagas and McKinley-Darragh join the hundred per cent. rank, while the Trethewey will only have to increase its gait by two per cent. to enter the same distinguished company.

While the Trethewey cannot compare in opulence to its neighbours to the west or the south—the Coniagas and the Nipissing—it has found new strength this year in the discovery of several ore bodies not hitherto suspected to exist or at any rate only dimly foreshadowed in previous development. The mill is now producing at the rate of 2,000 ounces a day in addition to mine ore, and in a report made two months ago by the general manager, Mr. Charles O'Connell, it was stated that there was underground two years' supply of ore for the mill and another year at the present rate of a hundred tons per day upon the dumps. It is anticipated that next year the Trethewey will not only redeem its old capitalization, but will make one of the mines producing a million ounces in the twelve months. The Buffalo, the first property on the West Ridge to attain its maturity as a producer had no difficulty in maintaining its production to its dividend levels and still carry a good surplus. It produced in the year 1910-1911 over a million and a half ounces, and there is little doubt that it will be able to maintain that figure in 1912. The mill treated during the year 41,484 tons averaging no less than 36.07 ounces per ton. In spite of the continued production on a large scale, Mr. Tom Jones was able to report at the end of last year that the ore reserves had been increased by 1,118,000 ounces principally on the No. 10 vein which has developed very satisfactorily.

While the City of Cobalt has been disappointing, the Cobalt Townsite bids fair to develop into a miniature Buffalo. Under the control of English interests little faith has till the

last year or two been placed in the mine and it was consistently starved in the belief that the less spent, the less wasted. Under careful management the property that was believed to possess no future has now yielded 750,000 ounces in the past fiscal year and for the coming twelve months will yield at least a million ounces. As so far no English company in the Cobalt or Northern Ontario silver field has paid a dividend the possibility that this property may do so has a significance. The principal discoveries have been made right on the Buffalo line but before Mr. Redington resigned the management he blocked out some good ore in the shaft near the Right of Way which can be taken out at any time. Most of the revenue of the mine comes from the concentrates shipped from the Northern Customs concentrator where a contract has been made to treat 75 tons per day.

Without any hastening of the pace or apparent exhaustion of reserves the McKinley-Darragh has been able to make 1911 their apex year by 20,000 or 30,000 ounces. It is scarcely likely that the dividend record of 50 per cent. in a year will be maintained, but with the growing worth of the Savage 40 per cent should be easily maintained next year. Like all the properties in the Huronian, shallowness of ore body appears to be more than counterbalanced by the multiplicity of veins or veinlets in quite extensive ore bodies. The mill is treating 125 tons daily of about 36 ounce ore, and very little mine ore is shipped from the McKinley, all goes through the mill. The Savage on the other hand yields the high-grade mine ore with less extensive fissuring and values in the wall rock near the veins.

The Cobalt Lake has built a mill and shown remarkable activity in shipping low grade ore. What the returns from the smelters have been will be known only when the annual report is published.

What the Nipissing has lost on the east side of the lake it has gained on the west where the Meyer, the Fourth of July and Vein 100 are showing unexpected resources. The north side of the Nipissing is no longer a collection of shafts, but a closely connected system which will have its low grade centre at the big 200-ton mill which will be ready for use on Nipissing Hill by about November. What little prospecting was undertaken on the surface was conducted for the most part in second-class territory and no tangible results were obtained. So successful has been the treatment of the high grade ore in the plant established under the direction of Mr. Charles Butters on Nipissing Hill that in addition to producing about two million ounces a considerable amount of customs ore was taken and treated. While paying 30 per cent. a year the Nipissing has been able to build up a surplus of a million and a half dollars. There has been no gouging of the mine to produce the 4,710,074 ounces to their credit this year, and the $226,000 net taken out monthly has often been provided and set aside ahead of time.

GENERAL MINING NEWS

QUEBEC

Montreal.—The first meeting of the representatives of the Canadian, English and American bondholders of Amalgamated Asbestos is being held in New York to talk over a reorganization plan to be submitted to the bondholders.

Mr. H. J. Fuller will represent the Canadian protective committee; Mr. J. E. Aldred, the English Committee, while Mr. U. H. McCarter, of the Prudential Trust Co., of New York, will look after the United States interests.

It will likely take several more conferences before a satisfactory plan is formulated, but everybody feels hopeful that the bondholders will in the end hear of a plan that will meet with their hearty endorsation.

Canadian bonds amounting to over $1,000,000 have been deposited with the National Trust Co., and the amount is expected to grow considerably. The more bonds the Canadians have behind them the better.

ONTARIO

Hamilton.—Hamilton is to be made the steel and wire centre of Canada.

This announcement has been made by Mr. Robert Hobson, general manager of the Steel Corporation of Canada, who states that the erection of two new open hearth furnaces of fifty tons' capacity a day each will be commenced at once; also a 32-blooming mill, a billet mill and a combination rod and bar mill. The buildings are to be erected by April, and the mills will be in operation by next October. Employment will be given to 1,000 additional skilled workers.

Later on it is intended to erect factories for finishing wire goods.

The company has a big staff of engineers laying out the grounds for other large buildings.

Haileybury.—Two additional 50-horse-power boilers are being set in position by the Casey-Cobalt mines, at their property north of New Liskeard, which gives the company as good a plant as many of the mines in the Cobalt camp. There was some talk among the directors of installing a mill on the property to treat the large amount of low grade ore that is being mined but the matter has not been settled, and it is hardly likely that the concentrator will be built during the present winter.

Cobalt.—The London Times contains a statement of the estimated production of the Townsite of Cobalt, indicating that it will produce about $500,000 worth of silver per annum at a cost of about one-third of the amount produced. This would make the net profits considerably over $300,000 per annum.

The Cobalt Townsite is the first British company operating at Cobalt to be put on a dividend basis.

Cobalt.—For the year 1911 the Cobalt Townsite Mining Company, one of the two companies in Cobalt controlled by English capital, will produce almost a million ounces. Not more than a year and a half ago it was considered a dead prospect. The fiscal year of the company ended on October 31, and this year the company produced $393,000 net. The production for the calendar year will almost certainly exceed that amount. The company now has a contract with the Northern customs mill at Cobalt whereby the latter takes 75 tons per day of the Townsite low-grade ore and treats it. As the mill is within a few feet of the Townsite's main shaft, there is little cost in the handling. The heads at the mill ran 28 ounces to the ton, which leaves a handsome profit.

The total weekly production of the mine is now running about 21,000 ounces per week, or about $11,000. There is also definitely blocked out in the mine about a million and a half ounces of silver. The Townsite has probably made a bigger gain in production and ore reserves than any other property in the Cobalt camp for the year 1911. The stock of the company held in England is widely scattered and the good results now being obtained from the mine should have a beneficial effect on other British investments in Northern Ontario.

Porcupine.—The Ontario Gazette announces the incorporation of the Timmins settlement, directly opposite the Hollinger mine, on Miller Lake, as a municipality. This will be the first settlement in the whole of the gold district to attain that dignity, the other centres of population not caring to incur the responsibilities of municipal life until they are set firmer on their feet. The first town in the gold camp elected its first Mayor on January 7, the nominations having taken place by a special dispensation on January 1.

The new town will include the Campbell Veteran property,

on which the settlement is situated, the Hollinger mine, the Dixon claim and the Miller Middleton; in fact, all the holdings of the Timmins-McMartin-Dunlap syndicate in the section. As a town it will, of course, be precluded from sharing in the royalties exacted from the mines in the township of Tisdale, but on the other hand, the township of Tisdale will not be allowed to take toll of the share of the profits from the mines within the boundaries of the town; that will go to the new municipality.

ALBERTA

Lethbridge.—As a result of the discovery of coal near Cardston, that place will be the headquarters of the Cardston Coal & Coke Co., which will be shortly incorporated to handle the proposition. R. E. McArthur, civil engineer here, will be the leading figure in the new company. Other members of the corporation will be Alf. Smith, J. Brodie, H. M. and W. A. Whiddington of Lethbridge, and Benjamin Street, J. L. Leavitt and William Laurier of Cardston. The new company will be incorporated with a capital of $150,000. They have just recently received the leases for the property in question and will commence development work immediately.

BRITISH COLUMBIA

Hedley.—The Hedley Gold Mining Company has declared a regular dividend of three per cent. with an additional dividend of seven per cent. This makes a total disbursement of 25 per cent. for the year. The new ore discovery under the bunk house, continues to open up in good shape, and hold the grade of value. So far as yet shown, it appears to be a separate and distinct ore body, and bids fair to add materially to the quantity of ore in sight. The lower workings of the Nickle Plate with the latest finds in that part of the mine are also doing their share to make conditions particularly rosy. The new policy of keeping development well ahead of the extraction is proving satisfactory.

Rossland.—Ore assaying $73 to the ton in the Richmond property owned by Sam Forteath and others, and a carload from the Blue Bird—belonging to Lyman Carter of Spokane—which yielded $1,180, or $45 a ton, formed a recent record of the Rossland south belt. The year 1912 will, it is hoped, witness the commencement of active mining operations in this section of the camp.

Victoria.—The Canadian Collieries (Dunsmuir), Limited, has let contracts in connection with the development of a hydro-electric water power in Comox district, Vancouver Island, British Columbia. The construction work now in progress includes making a dam and constructing a water line, the latter to be three miles long. It is intended to develop 11,000 horsepower and to use the power at the coal mines of the company's Union colliery, near Cumberland, and for other purposes.

In the same district the company is sinking a shaft, to be about 1,000 feet in depth, this development being in connection with the intended opening of a new mine, from which, however, it will not be practical to obtain coal until at least a year from now. Money has been appropriated for much other work with the object of putting the mines in condition to materially increase their regular output of coal.

Meanwhile production is being maintained on a similar scale to that of 1910, in which year the company's gross production was 898,908 long tons of coal, of which 380,482 tons was from the mines of its Extension colliery and 518,426 tons from those of its Union colliery. There is an active demand for all coal mined at the several collieries operating on Vancouver Island.

NOVA SCOTIA.

[Editor's Note.—This summary is reprinted from the Halifax Morning Chronicle, which at the close of each year publishes an exceptionally complete review of industrial progress in Nova Scotia. Mr. H. B. Pickings, Deputy Inspector of Mines, is the author. Incidentally, we can hardly agree with Mr. Pickings' methods of valuing the mineral output of the Province—especially in the items of steel, iron ore, and coke.]

The mineral production of Nova Scotia for the year 1911 shows a large increase over the production of the year 1910, and is the largest in the history of the mining industry of the Province. The different branches of the industry, with but three exceptions, show largely increased outputs, whereas the decreases shown are very small. With the exception of iron ore, pig iron, steel, prices have been the same as during the preceding year.

The Coal Output.

A total of 6,400,000 tons of coal were mined, this being an increase of 700,000 tons over the production of 1910. The Dominion Coal Company took over and reopened the mines of the Cumberland Railway and Coal Company at Springhill, and has during the year opened three new mines in Cape Breton County. This company had at the close of the year fifteen producing mines and five mines in stage of development on the Island of Cape Breton. At Stellarton the Acadia Coal Company has been engaged in extensive alterations and additions to its equipment, electrifying the plant. At North Sydney the MacKay Mining Company has completed and is now operating a coal briquette plant.

The production of coke for the year was 500,000 tons, an increase of 55,000 tons over the 1910 production. The principal producers and users of coke in the Province are the Dominion Iron and Steel Company and the Nova Scotia Steel and Coal Company.

Iron Ore Production.

A total of 840,000 tons of iron ore was imported into the Province; 140,000 tons more than the amount imported during 1910, and 40,000 tons of ore was mined in the Province, this being 10,000 tons less than the amount mined during 1910.

Pig-Iron and Steel.

400,000 tons of pig iron and 445,000 tons of steel ingots were made, being increases of 50,000 tons and 33,000 tons respectively. The iron-ore, pig iron and steel markets throughout the world have been dull, and prices consequently low.

At Torbrook the Canada Iron Corporation has completed an ore concentrating plant. This company, in August, on account of the unsatisfactory condition of the iron market ceased to operate its mines. Operations are to be resumed just so soon as the market conditions improve.

Gypsum and Gold.

The output of the different gypsum companies was 310,000 tons, a decrease of 15,000 tons from the production of 1910. The industry is in a healthy condition, and preparations are being made to open new quarries and increase productions.

Gold mining has not been engaged in as extensively as in 1910, and the production of 7,500 ounces shows a decrease of 3,000 ounces when compared with the production of that year. The closing of the Richardson mine at Goldboro and the Sterling mine at Oldham, the two largest producers in 1910, reduced the 1911 production by approximately 6,000 ounces. Present indications are that there will be a somewhat larger production during the coming year.

Building, monumental, and paving stone quarries, produced 10,000 tons, being a slight increase over the 1910 production.

The brick yards of the Province produced 23,000,000 bricks, and 1,200,000 feet of different sizes and styles of tile, drain, conduit and sewer pipe, both increases over the 1910 production.

The Tungsten Mines.

At Scheelite, Moose River, the Scheelite Mines, Ltd., continued the development commenced last year in connection

with its tungsten areas. Additional shafts have been put down and long levels driven, good ore has been encountered, a modern concentrating mill and power house have been constructed, the equipments placed and the plant is now in operation. Ore shipments will be made early in the New Year.

At New Ross, the Nova Scotia Manganese Company has lately completed a concentrating mill and power house, and has part of the machinery in place; recent development work at the mine has opened up large bodies of high grade pyrolusite. This company is now prepared to make shipments of ore.

At Lake Ainslie, Cape Breton, the Barite, Limited, has recently completed a modern mill and expect to commence shipment of its products early in 1912. The milling of barite at the mine is a new departure for the Province; in the past all ore being shipped from the mines in a crude state.

Value of Mineral Products.

The following table shows the approximate values of the mineral production of the Province for the year:

Coal	$19,200,000
Steel	8,900,000
Pig Iron	4,800,000
*Iron Ore	2,475,000
Coke	2,200,000
Quarry products	880,000
Gold	142,000
Clays	190,000
Mis. Scheelite, Manganese, etc.	100,000
Total	$38,887,500

*120,000 Nova Scotia ore balance imported.

The mineral industry of Nova Scotia is year by year becoming of greater importance. Booms, such as occurred at Cobalt, Porcupine, etc., are practically unknown here, the expansion and growth being gradual and along conservative lines, and people not directly connected with some branch of the industry seldom realize its importance. Nowhere else in the world, in so small a territory, are so many kinds of minerals found in economic quantities, and few countries of its size equal in value its mineral production. Mining and metallurgical practices throughout the Province are well abreast with the times, and will bear comparison anywhere.

Notwithstanding the flourishing condition of most branches of the industry, there is plenty of room for expansion and growth, particularly in connection with gold, oil shale, gypsum, iron, and copper deposits.

There are at the present time no serious labour troubles at any of the mining centres, and the general outlook points to greater productions for the year 1912.

STATISTICS AND RETURNS

B. C. ORE SHIPMENTS.

With last week's ore shipments the total for the year 1911 reached 1,451,710 tons for the mines of the Kootenay and Boundary districts. The smelter receipts for the year total 1,351,429 tons.

This week, ending December 30th, the Granby mine and smelter appear on the list for the first time since June last, when the shortage of coke caused by the strike in the Crow's Nest Pass caused the shutdown.

The last week of the year saw several new properties on the shipping list for the first time during the 12 months. The Molly Gibson mine at Coryell, near the international boundary line, which has constructed a new mill recently, shipped 22 tons. The new shippers from the Slocan were the Neepawa, the Madison, the Livingstone and the Ophir. The Standard mine again figured on the list with a heavy shipment, being credited with 191 tons and 300 tons milled. The Whitewater shipped 42 tons.

Boundary Shipments.

Granby	9,442	599,855
Mother Lode	5,198	312,695
Unnamed	104	15,213
Emma	721	1,023
Other mines	....	114,611
Total	15,465	1,043,397

Slocan-Kootenay Shipments.

Sullivan	48	16,618
St. Eugene, milled	420	26,496
Richmond-Eureka	31	2,212
Rambler-Cariboo	30	1,688
Queen, milled	420	21,530
Granite-Poorman, milled	420	13,010
Emerald	45	2,095
Standard	191	1,137
Knob Hill	163	5,415
Molly Gibson (Coryell)	22	22
Molly Gibson (Nelson)	47	1,142
Van Roi, milled	800	38,449
Arlington (Erie)	28	237
Madison	3	3
Neepawa	14	14
Whitewater	42	63
Livingstone	5	5
Ophir	6	6
Standard, milled	300	1,500
Other mines	....	18,338
Total	3,055	149,980

Rossland Shipments.

Centre Star	3,394	195,168
Le Roi No. 2	57	27,828
Le Roi No. 2, milled	300	15,600
Le Roi	659	19,235
Other mines	....	502
Total	4,410	258,333

B. C. Copper Co.'s Receipts.

Greenwood, B.C.

Mother Lode	5,198	312,695
Unnamed	104	15,213
Emma	721	1,023
Other mines	....	102,777
Total	6,023	430,708

Consolidated Co.'s. Receipts.

Trail, B.C.

Centre Star	3,394	195,168
Le Roi No. 2	57	27,828
Sullivan	48	16,618
St. Eugene	64	6,671
Richmond-Eureka	31	2,212
Knob Hill	163	5,415
Molly Gibson (Nelson)	47	1,142

Queen	38	869
Standard	191	1,137
Van Roi	62	1,745
Le Roi	659	19,235
Neepawa	14	14
Whitewater	42	63
Madison	3	3
Emerald	45	2,095
Arlington (Erie)	28	237
Rambler-Cariboo	30	1,688
Molly Gibson (Coryell)	22	22
Other mines	....	38,704
Total	4,943	320,866

Granby Smelter Receipts.

Grand Forks, B.C.

Granby	9,442	599,855

SHARE MARKET.

(Courtesy of E. D. Warren & Co.)

COBALT STOCKS.

	January 6th, 1912. Bid.	Asked.
Bailey	.02	.02½
Beaver Consolidated	.41½	.42½
Buffalo	1.35	1.60
Chambers-Ferland	.10	.11
Cobalt Lake	.28¾	.29
Coniagas	6.80	7.10
Crown Reserve	2.85	2.95
Great Northern	.10¼	.10¾
Kerr Lake	2.60	2.90
La Rose	3.72	3.83
McKinley	1.64	1.67
Nipissing	6.55	6.65
Peterson Lake	.07	.08
Right of Way	.06¼	.06½
Temiskaming	.30	.32
Trethewey	.60	.75
Wettlaufer	.79	.84
Little Nip.	.01	.01½
Green Meehan	.01¾ Bid	
Silver Leaf	.03	.03½

PORCUPINE STOCKS.

American Gold	1.18	118½
Apex	.10½	.11½
Monita	.12	.16
Dobie	.50	1.05
Dome Extension	.54	.54½
Foley-O'Brien	.35	.40
Rea	1.80	1.84
Hollinger	13.67	13.75
North. Exploration	1.62½ Bid	
Pearl Lake	.37	.43
Central	3.40	3.60
Imperial	.07	.07½
Northern	.73	.74
Tisdale	Off	.03½
Preston East Dome	.11	.11½
Standard	Off	.20
Swastika	.21½	.22
Porcupine Gold	.57	.57½
United	.03	.03½
West Dome	.60	.90
Crown Chartered	.50	.52
Gold Reef	.10	.14
Porcupine Canada	.85	1.00
Achilles	.33¾	.34
Jupiter	.52	.53
Porcupine South	.61	.62

TORONTO MARKETS.

Jan. 6.—Quotations from Canada Metal Co., Toronto)—
Spelter, 6.75 cents per lb.
Lead, 4.35 cents per lb.
Antimony, 7 to 9 cents per lb.
Tin, 45 cents per lb.
Copper, casting, 14.50 cents per lb.
Electrolytic, 14.50 cents per lb.
Ingot brass, 7 to 12 cents per lb.

Jan. 6.—Pig Iron.—(Quotations from Drummond, McCall & Co., Toronto.)
Sumerlee No. 1, $23.00 (f.o.b. Toronto).
Summerlee No. 2, $22.50 (f.o.b. Toronto).
Midland No. 1, $18.50 (f.o.b. Toronto).
Midland No. 2, $18.00 (f.o.b. Toronto).

GENERAL MARKETS.

Coal, bituminous, $3.50 to $4.50 for 1¼-inch lump.
Coal, anthracite, $5.50 to $6.75.

Coke.

Jan. 4.—Connellsville coke (f.o.b. ovens).
Furnace coke, prompt, $1.70 to $1.75 per ton.
Foundry coke, prompt, $1.90 to $2.00 per ton.

Jan. 4.—Tin, straits, 42.60 cents.
Copper, Prime Lake, 14.20 cents.
Electrolytic copper, 14.20 cents.
Copper wire, 15.25 cents.
Spelter, 6.45 cents.
Lead, 4.45 to 4.50 cents.
Sheet zinc (f.o.b. smelter), 8.00 cents.
Antimony, Cookson's, 7.87½ cents.
Aluminium, 18.50 to 19.00 cents.
Nickel, 40.00 to 45.00 cents.
Platinum, ordinary, $46.00 per ounce.
Platinum, hard, $48.50 per ounce.
Bismuth, $1.80 to $2.00 per lb.
Quicksilver, $43.00 per 75-lb. flask.

U.S. PIG IRON OUTPUT

Bradstreets estimates the United States pig iron production for the year at 24,000,000 tons, a decrease of 12 per cent.

COBALT'S OUTPUT FOR 1911

The estimate is made, based upon preliminary figures that the silver output from the Cobalt camp for the year will be approximately 32,000,000 ounces, which if realized, means that this year will be a record-breaking one, exceeding that of 1910 by more than 2,000,000 ounces. The heavier tonnage is traceable to the increased tonnage of low grade ore treated.

Cobalt in its eight years of life has made a wonderful record report as a silver producer; having turned out approximately 125,000,000 ounces of white metal, with a gross value of nearly $65,000,000. The annual production in ounces with value per ton has been as follows:—

	Ounces	Value
1904	206,875	$111,887
1905	2,451,356	1,360,503
1906	5,401,766	3,667,551
1907	10,023,3.1	6,155,341
1908	19,437,875	9,133,378
1909	25,897,825	12,461,576
1910	29,856,069	15,375,000
*1911	32,000,000	16,000,000
	125,275,077	$64,265,236

COBALT RETURNS.

The silver production of Cobalt in the year 1911 will establish a new record production for the great Ontario silver mining district. The actual tonnage shipped as shown in the table published elsewhere in these columns, amounts to only 25,763 tons, and as such falls materially below the figures for the year 1910, when actual shipments of 33,977 tons were made. The discrepancy is due to the fact that in 1911 many of the mines confined their shipments of ore to concentrates, and as such the indicated value of the output will show up much larger in comparison than the published figures show.

It is also to be considered that Cobalt has made heavy shipments of silver bullion during the year, these amounting in all to a valuation of $1,678,353. This amount is to be added to the total production represented in the ordinary ore shipments, and will bring the aggregate considerably above the record for 1910.

It is too early as yet to form any accurate idea of the total value of the Cobalt production for the year, but it has been conservatively estimated that it will run into something like $16,500,000, an increase of a million dollars over 1910, when the output was valued officially at $15,477,98[illegible].

The shipments of bullion from the Cobalt camp for 1911 were as follows:—

Nipissing	1,751,187	$987,224
Nova Scotia	517,296	261,300
O'Brien	234,699	166,484
Crown Reserve	307,023	158,237
Timiskaming	85,282	42,502
Buffalo	71,845	39,283
Kerr Lake	13,740	6,266
Hudson Bay	10,292	4,369
Hargraves	5,023	2,776
Trethewey	3,518	1,680
Drummond	3,148	1,689
Cobalt Townsite	1,947	952
Silver Cliff	1,032	453
Colonial	468	257
Wettlaufer	330	160
Waldman	328	140
Unclassified	9,770	4,373
Total		$1,678,353

NOVA SCOTIA STEEL AND COAL CO.

The 1911 and 1910 outputs of the Nova Scotia Steel and Coal Co., are as follows:

	1910	1911
Coke made	90,360	97,971
Pig iron made	66,000	84,166
Steel ingots	31,521	84,503
Billets cogged	59,000	78,389
Shipments of finished materials, steel bars, ingots, plates, and forgings	60,200	69,800

As showing the extension of the company's business during the past seven years, the following output figures for 1903 and 1911 are interesting:—

	1903	1911
Pig iron	27,490	84,166
Steel ingots	31,521	84,503
Finished steel bars, plates and forgings	27,631	69,800

Mr. Thos. Cantley, general manager, stated recently that notwithstanding the depression which shadowed the trade during the year, considerable progress was made by the Scotia Company, and substantial increases shown in all its manufacturing departments.

Iron ore mining at Wabana passed through a period of transition during the year due to the substitution of submarine for surface mining, and while the tonnage exceeded that of 1910 these altering conditions prevented increase in output proportionate to the annual gain usually shown in this department.

In coal mining, a serious accident in the largest producing mine of the company early in January caused a heavy falling off in the output for the first quarter of the year. This mine has now, however, been working up to its full output for some months and while the output from all five collieries for the last quarter of the year exceeded the figures for the corresponding period of the previous year, the initial setback was not entirely overcome.

Very satisfactory increases were recorded in the metallurgical operations of the company.

COBALT ORE SHIPMENTS

Following are the shipments from the Cobalt camp for the week ending Dec. 29, and those from Jan. 1, 1911, to date:—

	Dec. 29. Ore in lbs.	Since Jan. 1. Ore in lbs.
Badger	.....	55,200
Bailey	.....	40,000
Beaver	.....	1,585,297
Buffalo	62,200	2,570,467
Casey Cobalt	.....	261,265
Chambers-Ferland	.....	1,364,900
City of Cobalt	.....	727,180
Cobalt Lake	126,640	4,162,900
Colonial	.....	227,910
Cobalt Townsite	59,000	1,388,053
Coniagas	.....	3,971,305
Crown Reserve	41,116	2,133,145
Drummond	.....	1,440,000
Green-Meehan	62,170	207,970
Hargraves	.....	204.880
Hudson Bay	.....	1,576,279
Kerr Lake	.....	2,520,190
King Edward	.....	40,000
La Rose	216,109	7,292,706
McKinley - Dar	148,161	6,491,736
Nipissing	130,964	6,032,281
O'Brien	.....	1,388,788
Little Nip	.....	58,430
Powerful	.....	2,010
Provincial	.....	202,050
Right-of-Way	.....	1,336,035
Silver Alliance	3,484	3.484
Silver Cliff	.....	106,680
Standard	.....	102,813
Temiskaming	62,540	1,748,641
Trethewey	58,620	1,330,746
Wettlaufer	.....	851,860

The shipments for the week were 1,071,004 pounds, or 535 tons, against 359 tons the previous week.

The shipments from Jan. 1 to Dec. 29 were 51,526,061 lbs., or 25,763 tons.

SILVER PRICES.

	New York. cents.	London. pence.
Dec. 26	54½	..
" 27	54⅜	..
" 28	54⅜	25⅛
" 29	54⅜	25⅛
" 30	54¼	25 1/16
Jan. 2	54⅝	25 3/16
" 3	54¾	25¼
" 4	54⅞	25 5/16
" 5	55	25⅜